Contracting Branch
Infrastructure Division
4200 Smith School Road
Austin, Texas 78744

INVITATION FOR BIDS

AND

CONTRACT DOCUMENTS

FOR

PROJECT NUMBER 126476
CHAPARRAL WILDLIFE MANAGEMENT AREA
COTULLA, DIMMIT COUNTY, TEXAS
BUNKHOUSE COMPLEX REPLACEMENT

ADDITIVE ALTERNATE: PROJECT NUMBER 126828C
CHAPARRAL WILDLIFE MANAGEMENT AREA
COTULLA, DIMMIT COUNTY, TEXAS
VISITOR CENTER LANDSCAPING

(FEDERALLY FUNDED PROJECT)

P-O-C:
Gisela Alanis, Contract Manager, CTPM, CTCM
Email: gisela.alanis@tpwd.texas.gov
Direct Line: 512-389-4480

ISSUE DATE: March 21, 2019
BIDS DUE NO LATER THAN
2:00 PM (CST), MAY 2, 2019
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**SPECIFICATIONS:**

Refer to Table of Contents in Technical Specifications

**DRAWINGS:**

65 Sheets
NOTICE TO BIDDERS

Sealed bids will be received by the Contracting Branch, Infrastructure Division, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, Texas 78744, UNTIL 2:00 P.M. (CST), MAY 2, 2019 for Project Number 126476 and Additive Alternate Project Number 126828C at Chaparral Wildlife Management Area, Cotulla, Dimmit County, Texas. The bid opening will be conducted in A-100 Conference Room. The estimated range of construction cost is $1,120,000.00 to $1,320,000.00.

Project No. 126476 - Bunkhouse Complex Replacement Includes: Furnish all labor, equipment, materials, and incidentals necessary but not limited to: construct one (1) new group bunkhouse; one four-unit (4) bunkhouse that includes new connections to site utilities and new OSSF, in accordance with the Bidding and Contract documents.

Project No. 126828C - Additive Alternate: Visitor Center Landscaping Includes: Furnish all labor, equipment, materials, and incidentals necessary but not limited to: construct visitor center landscape, in accordance with the Bidding and Contract documents.

Performance Period: All work shall be completed within Three Hundred (300) calendar days commencing on the date specified in the Notice to Proceed.

Minimum Experience Requirements: Bidder must meet minimum qualifications requirements as stipulated in Division 1 – General Requirements, Section 01000 – Special Conditions, paragraph 1.32 to be eligible for contract award.

HUB Subcontracting Plan (HSP): Each bidder must complete and return with the bid an HSP following the policy and utilizing the forms contained with the Invitation for Bids and Contract Documents included herein. FAILURE TO COMPLETE AND RETURN THESE FORMS WITH THE BID WILL BE CAUSE FOR REJECTION OF THE BID. THE CONTRACTOR RECEIVING AN AWARD MUST COMPLY WITH THE SPECIAL REQUIREMENTS SPECIFIED HEREIN.

Pre-Bid Conference: A Pre-Bid Conference will be held at the Chaparral WMA located at 64 Chaparral WMA Dr., Cotulla Texas 78014 at 11:00 a.m. on Friday, April 5, 2019. Although the pre-bid conference is not mandatory, Bidders are strongly encouraged to attend as important information regarding Bidding requirements and the Project will be discussed. Failure to give proper consideration to site conditions when preparing the bid will not constitute grounds for additional compensation.

Contact Information: For technical information and information regarding administration of the contract, contact Contract Manager, Gisela Alanis, at 512-389-4480 or gisela.alanis@tpwd.texas.gov.

To view and download full Bidding and Contract Documents, visit the TWPD web site using: http://tpwd.texas.gov/business/bidops/current_bid_opportunities/construction/

TEXAS PARKS AND WILDLIFE

INSTRUCTIONS TO BIDDERS

1. **BIDS:** Bids must be received in the Infrastructure Division of the Texas Parks and Wildlife Department (TPWD) Austin, Texas NO LATER THAN the date and time specified in the Notice to Bidders. Bids received after this time will not be considered and will be returned unreviewed. Bidders are advised that TPWD’s Headquarters Complex does not open until 8:00 A.M. Bidders should plan their delivery method accordingly. Each bid shall be submitted on the Contractor's Bid form provided.

**FAXED AND/OR EMAILED BIDS WILL NOT BE ACCEPTED. BIDS MUST BE ENCLOSED IN A SEALED ENVELOPE, BOX, OR CONTAINER CLEARLY MARKED ON THE OUTSIDE AS AN “OFFICIAL BID” AND SHALL INCLUDE THE FOLLOWING INFORMATION: PROJECT NUMBER, PROJECT DESCRIPTION, PROJECT LOCATION, BID OPENING DATE AND TIME.**

Bids shall have all blanks fully and legibly completed including a price for all alternates and/or unit costs when listed under the base bids on which a bid is submitted. Failure to do so shall result in rejection of the bid. Corrections in the bidder’s bid shall be legible and initialed. The bid form shall show no alterations or qualifications of any kind. Bids must be signed by an individual who has the authority to legally bind the firm. TPWD reserves the right to require a bidder to furnish documentary evidence of Bidder’s signature authority.

Corrections, deletions, or additions to bids may be made by facsimile (FAX), provided such FAX are received in correct and comprehensive form prior to the opening time of bids and an original reflecting said corrections, deletion, or additions must be submitted to TPWD within two (2) business days of submitted FAX. No telephonic instructions will be accepted. FAX corrections, deletions or additions to bids shall be sent to FAX number: 512/389-4790, attention: Gisela Alanis, Contract Manager. This is the only number that will be used for receipt of corrections, deletions, or additions. TPWD shall NOT be responsible for failure of electronic equipment or operator error.

TPWD reserves the right to reject any or all bids and to waive any or all informalities in connection therewith. TPWD does not bind itself to accept the lowest bid or any part thereof and reserves the right to ask for new bids for the whole or parts. The mere opening and reading aloud of a bid shall not constitute TPWD’s acceptance of the suitability of a bidder or a bid. The competency and responsibility of the bidders will be considered in making an award. TPWD reserves the right to award, partially award, or not award a contract if no responses are deemed acceptable; and may re-solicit as determined necessary and in the best of the State of Texas.

2. **BASIS OF AWARD:** Determination of the low bidder will be based on the lowest responsible base bid and/or a combination of the base bid and alternate bids. Alternates accepted will be considered in determining the low bidder, but TPWD does not obligate itself to accept an alternate or to accept alternates in any order listed unless otherwise stipulated elsewhere in the Invitation for Bids and Contract Documents.

3. **UNIT PRICE/ESTIMATED QUANTITY BIDS:** If the Bid furnished with this project requires a bid on a unit price/estimated quantity basis, the Bidder shall enter a unit price in the space provided therefor and a total item price based upon the estimated quantities shown on the bid form. Unit prices entered shall be the full price to TPWD including materials, labor, services, taxes, bonds, rentals, overhead, profit, etc., for the work described. Quantities shown reflect measurements taken from the Drawings and are assumed correct for bidding purposes. Final contract price will be based on actual quantities of work installed as determined by TPWD and Contractor upon completion of the work.
Award of contract shall be based upon the summation of the various unit price bids, but in case of error the unit prices shall govern, and computations will be checked for accuracy before award is made. Prices will also be reviewed for balance prior to award, and obvious imbalance in favor of work scheduled for early completion or subject to significant expansion after award may be grounds for rejection of the bid.

4. **BID SECURITY:** Unless otherwise stipulated in the Invitation for Bids and Contract Documents, only projects in which the total contract price exceeds $25,000.00, will require bid security. **Bids exceeding $25,000.00 must be accompanied by a bid bond, certified check or cashier’s check drawn to the order of the Texas Parks and Wildlife Department for not less than five percent (5%) of the total amount of the bid (including total of all separate bids for one or more projects bid and multiple base bids and/or alternate bids and/or optional bids and/or allowances).** Therefore, to ensure adequate bid security, bidders should calculate bid security based on the highest possible monetary award. Certified checks and cashier checks must be originals. No other forms of bid security or checks will be accepted. **Bid will be rejected if the appropriate security is not furnished in the form specified above and by the time set for the bid opening.**

Bid security for the three (3) lowest bidders may be retained by TPWD until the successful bidder executes the contract, and if required, furnishes bonds and certificates of insurance. All other bid security will be returned as soon as practical after bid opening.

Bid security for the successful bidder will be returned following execution of the contract and submission of satisfactory bonds and insurance. If the successful bidder fails to return the signed contract (and bonds and certificate of insurance when required) within the time specified, the bid security may be forfeited not as a penalty but as liquidated damages.

5. **INSURANCE REQUIREMENTS:** The successful Contractor must certify the minimum insurance coverages as set forth by the contract, specifically, the Uniform General Conditions, Article 5, 5.2. and Division 1 – General Requirements, Section 01000 – Special Conditions. The required insurance information shall be submitted within ten (10) calendar days from receipt of Notice of Selection. Failure to timely meet this requirement may result in disqualification of the bid and forfeiture of the bid security, if any. In such circumstances, TPWD shall be authorized to proceed with award to the next highest ranking, responsive and responsible bidder.

6. **BONDING REQUIREMENTS:** If the total contract price exceeds $25,000.00, a Payment Bond must be furnished by the successful Contractor. If the total contract price exceeds $100,000.00 a Payment Bond and a Performance Bond must be furnished by the successful Contractor. All bonds submitted shall be the original form bearing original signatures and seal. (See also Article 5, Uniform General Conditions)

7. **DISCREPANCIES:** Should any Bidder find discrepancies between the Invitation for Bids and Contract Documents, or should Bidder be in doubt as to their exact meaning, Bidder should notify TPWD at once. TPWD may then, at its option, issue addenda clarifying same. TPWD will not be responsible for oral instructions or for misinterpretation of Invitation for Bids and Contract Documents.

8. **ADDENDA:** TPWD reserves the right to issue addenda at any time prior to the bid opening. (See also General Requirements – Special Conditions). All addenda shall be acknowledged as received on the Contractor’s Bid Form. Oral changes in the work made during the bidding period are not binding. **BIDDER’S FAILURE TO ACKNOWLEDGE RECEIPT OF ADDENDA MAY RESULT IN REJECTION OF BID.**
No oral explanation in regard to the meaning of the Invitation for Bids and Contract Documents will be made and no oral instructions will be given before the award of the contract. TPWD requests that all discrepancies, omissions or questions as to the meaning of Drawings and Specifications shall be communicated in writing to the Contract Manager for interpretation by April 22, 2019 to the attention of Gisela Alanis, Contract Manager at the address stated in these Invitation for Bids and Contract Documents or via email to gisela.alanis@tpwd.texas.gov or via fax at 512-389-4790.

9. **PROHIBITED COMMUNICATIONS:** Upon issuance of this solicitation, TPWD, its representative(s), or partners will not answer questions or otherwise discuss the contents of this Solicitation with any potential Bidder or their representatives(s), except for the written inquiries described in the foregoing paragraph. Attempts to ask questions by phone or in person will not be allowed or recognized as valid.

   **Failure to observe this restriction may disqualify Bidder.** Bidder shall rely only on written statements issued through or by TPWD’s contracting staff. This restriction does not preclude discussions between affected parties for the purposes of conducting business unrelated to this solicitation.

10. **LABOR LAWS:** Contractors must comply with all labor laws established by State and Federal statutes. (See also Article 2, Uniform General Conditions).

11. **STATE SALES TAX:** TPWD qualifies for exemption from State and Local Sales and Use Taxes pursuant to the provisions of the Texas Tax Code (Title 2, Chapter 151, Subsection 151.309).

   The Contractor shall comply with applicable provisions of Chapter 34, Rules 3.291 and 3.357 of the Texas Administrative Code, or other procedures as may be prescribed by the State Comptroller of Public Accounts. Refer to Uniform General Conditions, Article 2.

12. **CONTRACTOR QUALIFICATIONS:** A Contractor's Statement of Qualifications must be submitted with the bid. Failure to properly complete and provide a Contractor's Statement of Qualifications shall be cause for the Contractor's bid being rejected by TPWD. TPWD may make such investigations as necessary to determine the ability of the Contractor to perform the work and reserves the right to reject any bid if the evidence submitted and/or obtained through investigation fails to satisfy TPWD that the Contractor is properly qualified to carry out the obligations of the Agreement.

13. **HISTORICALLY UNDERUTILIZED BUSINESS REPRESENTATIONS & CERTIFICATIONS:** BIDDERS ARE ADVISED THAT, in accordance with Texas Government Code, Sections 2161.181-182 and Title 34, Chapter 20, Subchapter B., 20.285 of the Texas Administrative Code (TAC), state agencies must make good faith effort to utilize Historically Underutilized Businesses (HUBs) in contracts for construction services, professional and consulting services and commodities contracts with an expected value of $100,000.00 or more. **Each bidder must complete and return with the bid a HUB Subcontracting Plan (HSP) following the policy and utilizing the forms contained with the Invitation for Bids And Contract Documents included herein. FAILURE TO COMPLETE AND RETURN THESE FORMS WITH THE BID WILL BE CAUSE FOR REJECTION OF THE BID. THE CONTRACTOR RECEIVING AN AWARD MUST COMPLY WITH THE SPECIAL REQUIREMENTS SPECIFIED HEREIN.** For questions, call HUB Staff, 512/389-4784. An instructional video, Microsoft Word® documents and PowerPoint® presentation can be located at:

   http://tpwd.texas.gov/business/bidops/hub/HSP/index.phtml

14. **PROTEST PROCEDURES:** Any Actual or prospective Respondent who is aggrieved in connection with this solicitation, evaluation, or award of any contract resulting from this solicitation may formally protest as
provided in TPWD’s rules at TAC, Title 31, Part 2, Chapter 51, Subchapter L, Rule 51.350.

15. **CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION:** Bidder certifies that the responding entity and its principals are eligible to participate in this transaction and have not been subjected to suspension, debarment, or similar ineligibility determined by any federal, state or local governmental entity and the Bidder is in compliance with the State of Texas statutes and rules relating to procurement and that Bidder is not listed on the federal government’s terrorism watch list as described in Executive Order 13224.

16. RESERVED

17. **ENERGY POLICY AND CONSERVATION ACT:** Contractor shall comply with the mandatory standards and policies related to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163, 89 Stat.871).

18. **BUY AMERICAN ACT:** (a) The Buy American Act (41 U.S.C. 10) provides that the Government give preference to domestic construction material. (b) The Contractor agrees that only domestic construction material will be used by the contractor, subcontractors, materialmen, and suppliers in the performance of this contract, except for foreign construction materials, if any, listed in this contract.
CONTRACTOR’S
BID
SUBMITTALS
CONTRACTOR'S BID

Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

Having carefully examined the Invitation for Bids and Contract Documents, Chaparral Wildlife Management Area, Project No. 126476 - Bunkhouse Complex Replacement, and Additive Alternate: Project No. 126828C - Visitor Center Landscaping, Cotulla, Dimmit County Texas for the Texas Parks and Wildlife Department, as well as the premises and conditions affecting this work, and all other contract documents, the undersigned proposes to furnish all labor, equipment and materials necessary to complete the work for the sum of:

BID SCHEDULE

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<th>LUMP SUM PRICE</th>
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<td>Furnish all labor, equipment, materials, and incidentals necessary, but not limited to: construct a new two (2) building complex including one (1) group bunkhouse and one (1) four-unit bunkhouse to replace the existing complex to be removed/relocated by others. Include new connections to existing site utilities, and provide a new OSSF to replace existing system, in accordance with the Invitation for Bids and Contract Documents.</td>
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<td><strong>TOTAL LUMP SUM BASE BID</strong></td>
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<td><em>(Total Lump Sum Base Bid Price written in words)</em></td>
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<td>Furnish all labor, equipment, materials, and incidentals necessary for the Visitor Center Landscape, including, but not limited to: construction of flagstone walks and patio, flagstone edging, river rock dry stream, prepare landscape planting beds, install irrigation system, rain water collection system, roof gutters and downspouts at the Chaparral WMA Visitor Center Building, in accordance with the Invitation for Bids and Contract Documents.</td>
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<td><strong>TOTAL BASE BID ITEM AND ADDITIVE ALTERNATE BID ITEM NO. 1</strong></td>
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<tr>
<td><em>(Total Lump Sum Base Bid Item and Additive Alternate Bid Item No. 1 written in words)</em></td>
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EACH BID ITEM INCLUDES ANY AND ALL APPURTEANANT WORK AND ITEMS NECESSARY
EACH BID ITEM INCLUDES ANY AND ALL APPURTENANT WORK AND ITEMS NECESSARY FOR FULLY FUNCTIONAL AND OPERATIONAL SYSTEMS, COMPLETE AND IN PLACE, IN ACCORDANCE WITH THE INVITATION FOR BIDS AND CONTRACT DOCUMENTS.

The determination of the low bidder will be based on responsiveness and responsibility of the bidder and on the Base Bid and Additive Alternate No. 1. HOWEVER, THE OWNER RESERVES THE RIGHT TO AWARD TO THE LOW BIDDER ANY COMBINATION OF BID ITEMS OR TO REJECT ALL BIDS.

BIDDER UNDERSTANDS AND ACKNOWLEDGES THAT BIDDER MUST MEET THE MINIMUM QUALIFICATION AND/OR EXPERIENCE REQUIREMENTS SET FORTH IN PARAGRAPH 1.32 OF DIVISION 1, GENERAL REQUIREMENTS, SECTION 01000, SPECIAL CONDITIONS TO BE ELIGIBLE FOR AWARD OF THIS CONTRACT. BIDDER, BY SIGNING THIS BID, AFFIRMS THAT BIDDER MEETS SUCH MINIMUM REQUIREMENTS. FAILURE TO MEET ANY OF THE MINIMUM QUALIFICATIONS SHALL RESULT IN REJECTION OF THE BID.

The undersigned hereby certifies that he can provide evidence, prior to contract award, of satisfaction of all applicable licensing requirements set forth in Texas Administrative Code, Title 30, Chapter 285. The undersigned further certifies that a full and complete list of enforcement actions, if any, has been included in the SIGNED AND SWORN AFFIDAVIT contained in the Contractor’s Qualification Statement.

The undersigned further agrees that, if awarded the Contract, the work will be completed within Three Hundred (300) calendar days commencing on the date specified in the Notice to Proceed.

The undersigned agrees that when written notice of bid acceptance is furnished by the Owner within sixty (60) calendar days after the bid opening date, the undersigned will, within the stipulated time, execute and deliver the contract and all required bonds, certificates of insurance, and PR-1 and PR-2 submittals and Form 1295 to the Owner. Failure to timely provide the insurance certificate, bonds, and submittals shall be grounds for disqualification of bid and forfeiture of bid security. In such circumstances, TPWD shall be authorized to proceed with award to the next lowest, responsive and responsible bidder.

If the above bid amount exceeds $25,000.00, the undersigned shall include herewith security in the form of a bid bond, certified check, or cashier's check for an amount not less than five percent (5%) of the total amount of the bid to be awarded by Owner, unless otherwise stipulated under Special Conditions. To ensure adequate bid security, bidders should calculate bid security based on the total amount of all base bids plus all additive alternate bids (if any). The bid security will be returned to or forfeited by the undersigned in accordance with the Bid Security provision in the Instructions to Bidders. The undersigned further agrees that this bid security is the appropriate measure of liquidated damages which the Owner will sustain by the failure of the undersigned to execute and deliver said contract and required documents.

The undersigned agrees that this bid will not be withdrawn for a period of sixty (60) calendar days from the date set for the bid opening, and the undersigned further agrees that the bid security will be forfeited in the event this bid is withdrawn before expiration of said sixty (60) calendar days.

Pursuant to 2252.908 of the Government Code, the awarded Contractor(s) must use the Texas Ethics Commissions Application to enter the required information on Form 1295. Awarded Contractor(s) shall print a copy of the completed form, which will include a certification of filing that will contain a unique certification number. An authorized agent of the business entity must sign the printed copy of the form and have the form notarized. The completed Form 1295 with the certification of filing must be filed at the time of execution of the contract.

Additional information can be found at: https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm
By the signature hereon affixed, the bidder hereby certifies that neither the bidder, nor the firm, corporation, partnership, or institution represented by the bidder, or anyone acting for such firm, corporation, or institution has violated the antitrust laws of this State, codified in Section 15.01 et seq., Texas Business and Commerce Code, or the Federal antitrust laws, nor communicated directly or indirectly the bid made to any competitor or any other person engaged in such line of business.

Pursuant to Texas Government Code, Title 10, Subchapter A, §2155.004 (a), Bidder acknowledges that Bidder has not received compensation for participation in the preparation of the specifications for this project.

Pursuant to Texas Government Code, Title 10, Subchapter A, §2155.004 (b), §2155.006 (c), and Subchapter B, §2261.053 (c), Bidder certifies that the individual or business entity named in this bid is not ineligible to receive the specified contract and acknowledges that this contract may be terminated, and payment withheld if this certification is inaccurate.

By signing this bid, Bidder certifies that if a Texas address is shown as the address of the Bidder, Bidder qualifies as a Texas Resident bidder as defined in Texas Administrative Code, Title 1, Part 5, Chapter 111, Subchapter A, §111.2 (10).

By signature hereon, the bidder hereby certifies that he/she is not currently delinquent in the payment of any franchise taxes owed the State of Texas under Chapter 171, Tax Code. Making a false statement as to corporate tax status is a material breach of contract.

Bidder certifies that the bidding entity and its principals are eligible to participate in this transaction and have not been subjected to suspension, debarment, or similar ineligibility determined by any federal, state or local governmental entity and that bidder is in compliance with the State of Texas Statutes and Rules relating to procurement and that bidder is not listed on the Federal Government’s Terrorism Watch List as described in Executive Order 13224. Entities ineligible for federal procurement are listed at http://www.sam.gov.

By signing this bid, a bidder affirms that he has not given, offered to give, nor intends to give at any time hereafter any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor or service to a public servant in connection with the submitted bid.

Bidder agrees that any payments due under this contract will be applied towards any debt, including but not limited to delinquent taxes and child support, which is owed to the State of Texas.

Bidder agrees to comply with Texas Government Code, Title 10, Subtitle D, §2155.4441, relating to use of services contracts for products produced in the State of Texas.

Bidder certifies that if a Texas address is shown as the address of the Bidder on this bid, Bidder qualifies as a Texas Bidder as defined in Section 2155.444(c) of the Texas Government Code.

Pursuant to Texas Government Code, Title 10, Subchapter F, §§ 2270.001-2270.002, TPWD may not enter into a contract with a company (as defined by Texas Government Code, Title 8, Subchapter A, § 808.001) that boycotts Israel. By signing this bid, Bidder verifies that in accordance with Texas Government Code, Title 10, Subchapter F, §§ 2270.001-2270.002, Bidder:

1. Does not boycott Israel; and
2. Will not boycott Israel during the term of the contract.

Pursuant to Texas Government Code, Title 10, Subchapter F, §§ 2252.151-2252.154, TPWD may not enter into a contract with a company (as defined by Texas Government Code, Title 8, Subchapter A, § 806.051) that is identified on a list prepared and maintained by the Texas Comptroller of Public Accounts under Texas
Government Code, §§ 806.001, 807.051 or 2252.153. By signing this bid, Bidder certifies that it is not a company identified on a list as prepared and maintained by the Texas Comptroller of Public Accounts pursuant to Texas Government Code, §§ 806.001, 807.051 or 2252.153.

By signature hereon, the bidder acknowledges that Texas Government Code, Title 10, Subchapter F, §§ 2252.201-2252.205 requires that all iron or steel products produced through a manufacturing process used in this project must be produced in the United States. By signing this bid, Bidder certifies that its bid price represents full compensation for compliance with the requirements of Texas Government Code, Title 10, Subchapter F, §§ 2252.201-2252.205.

By signing this bid, Bidder acknowledges and understands that the acceptance of funds by the Bidder or any other entity or person directly under this Contract, or indirectly through a subcontract under this Contract, shall constitute acceptance of the authority of the State Auditor’s Office, Comptroller or other agency of the State of Texas, TPWD or any successor agency, to conduct an audit or investigation in connection with those funds. The Bidder further agrees to cooperate fully with the above parties in the conduct of the audit or investigation, including providing access to any information the state auditor considers relevant to the investigation or audit. The Bidder shall ensure that this paragraph concerning the State’s authority to audit funds received indirectly by subcontractors through the Bidder and the requirement to cooperate is included in any subcontract it awards.

Bidder represents and warrants that the provision of goods and services or other performance under the contract will not constitute an actual or potential conflict of interest or reasonably create an appearance of impropriety.

If applicable, pursuant to Texas Family Code, Title 5, Subtitle D, §231.006(d), regarding child support, the Bidder certifies that the individual or business entity named in this bid is not ineligible to receive the specified payment and acknowledges that this contract may be terminated, and payment may be withheld if this certification is inaccurate. Furthermore, Bidder must provide, in the space(s) below, the name and Social Security number of an individual owner, a sole proprietor and all partners, shareholders, or owners with an ownership interest of at least 25% of the business entity prior to award of contract.

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Bidder certifies that they are in compliance with Texas Government Code, Title 6, §669.003, relating to contracting with executive head of a State agency. If §669.003 applies, Bidder will complete the following information in order for the bid to be evaluated:

Name of former executive: ________________________________

Name of State agency: ________________________________

Date of separation from State agency: __________________

Position with Bidder: ________________________________

Date of employment with Bidder: ________________________
RECEIPT IS HEREBY ACKNOWLEDGED OF THE FOLLOWING ADDENDA TO THIS IFB
(INITIAL IF APPLICABLE)

No. 01 _____ No. 02 _____ No. 03 _____ No. 04 _____ No. 05 _____ No. 06 _____ No. 07 _____

WARNING: BIDDER'S FAILURE TO ACKNOWLEDGE RECEIPT OF ADDENDA MAY RESULT IN
REJECTION OF BID.

BIDDER'S AFFIRMATION: SIGNING THIS BID WITH A FALSE STATEMENT IS A MATERIAL
BREACH OF CONTRACT AND SHALL VOID THE SUBMITTED BID OR ANY RESULTING
CONTRACTS, AND THE BIDDER SHALL BE REMOVED FROM ALL BID LISTS.

_________________________________________  By ____________________________
Name of Contracting Firm                     Authorized Signature          Date
_________________________________________
Address

_________________________________________
City         State         Zip

_________________________________________
(Area Code) Phone Number                     (Area Code) Phone Number

_________________________________________
Email address                                 (Area Code) FAX Number

_________________________________________
Texas Identification Number                  (Area Code) Cell Number
TEXAS PARKS AND WILDLIFE

CONTRACTOR'S QUALIFICATION STATEMENT

COMPLETE ALL SECTIONS OF THIS FORM AND SUBMIT WITH BID

<table>
<thead>
<tr>
<th>PROJECT NUMBERS</th>
<th>LOCATION: Chaparral Wildlife Management Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>126476-BUNKHOUSE</td>
<td>MAY 2, 2019</td>
</tr>
<tr>
<td>ADD. ALT.: 126828C-VISITOR CTR. LANDSCAPING</td>
<td></td>
</tr>
<tr>
<td>BID DATE:</td>
<td></td>
</tr>
</tbody>
</table>

FIRM

ADDRESS

PHONE

FAX

E-MAIL

Individual

Partnership

Corporation

If incorporated, under the laws of the State of ________________ with principal place of business in ____________________

PRINCIPALS IN FIRM AND YEARS EXPERIENCE IN CONSTRUCTION:

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>PHONE</th>
<th>NO. OF YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

FIRM HISTORY: List firm history below including any other business names used.

From __________ to __________ Firm Name ____________________

From __________ to __________ Firm Name ____________________

From __________ to __________ Firm Name ____________________

Has firm, under its current or former name(s) ever failed to complete a project, defaulted on a contract, or been engaged in litigation over a contract?  ____ Yes  ____ No.  If so, state particulars of most recent occurrence on separate sheet(s) and attach to this form.

CONSTRUCTION CAPABILITIES:

FIRM'S AVERAGE ANNUAL CONSTRUCTION VOLUME $ ____________________ Percentage of this volume by construction categories:

<table>
<thead>
<tr>
<th>Building</th>
<th>%</th>
<th>Mech.-HVAC</th>
<th>%</th>
<th>Hwy/Roads</th>
<th>%</th>
<th>Other</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical</td>
<td>%</td>
<td>Utility Lines</td>
<td>%</td>
<td>Earthwork</td>
<td>%</td>
<td>Other</td>
<td>%</td>
</tr>
<tr>
<td>Plumbing</td>
<td>%</td>
<td>Utility Plants</td>
<td>%</td>
<td>Site Work</td>
<td>%</td>
<td>Other</td>
<td>%</td>
</tr>
</tbody>
</table>
BONDING INFORMATION: Indicate agency/surety through which bonding will be obtained.

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>City/State/Zip</td>
<td>E-Mail</td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
<tr>
<td>Agent’s Name</td>
<td>Agent’s Phone</td>
</tr>
<tr>
<td>Name of Power of Attorney from Bond Company</td>
<td>Expiration Date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BONDING COMPANY</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>City/State/Zip</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Fax</td>
</tr>
<tr>
<td>Name of Representative</td>
<td>Phone</td>
</tr>
</tbody>
</table>

EXPERIENCE RECORD

List minimum of three (3) projects (attach additional sheets if necessary) that are at least 50% completed (50% completed projects will be counted towards successful projects) or have been completed within the last (5) years, and that demonstrate similar experience. Refer to DIVISION ONE – GENERAL REQUIREMENTS, Section 01000 - Special Conditions, paragraph 1.32.

1.

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Contract Amount</th>
<th>Beginning $</th>
<th>Ending $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Location</td>
<td>Address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Owner (Firm/Agency)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>State</td>
<td>Zip</td>
<td></td>
</tr>
<tr>
<td>Project Owner’s Rep familiar with project</td>
<td>Phone</td>
<td>Fax</td>
<td></td>
</tr>
<tr>
<td>Contract Start Date (Date of Notice to Proceed)</td>
<td>Contract Duration (Calendar Days)</td>
<td>If completed, date</td>
<td></td>
</tr>
<tr>
<td>If Project is still under construction, then provide percentage complete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If contract time extensions were added to the contract as a result of Bidder’s responsibilities, provide a short explanation of each.</td>
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<tr>
<td>Project Description and why it is comparable to this contract.</td>
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<td></td>
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<tr>
<td>Project A/E Name</td>
<td>A/E Phone</td>
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</table>
## EXPERIENCE RECORD: (CONTINUED)

### 2.

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<th>Contract Amount</th>
<th>Beginning $</th>
<th>Ending: $</th>
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<tbody>
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<td><strong>Project Location</strong></td>
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<td><strong>Project Owner’s Rep familiar with project</strong></td>
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<tr>
<td><strong>Contract Start Date</strong></td>
<td><strong>Contract Duration</strong></td>
<td>(Calendar Days)</td>
<td>(Date of Notice to Proceed)</td>
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<tr>
<td><strong>Project A/E Name</strong></td>
<td><strong>A/E Phone</strong></td>
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<th>Contract Amount</th>
<th>Beginning $</th>
<th>Ending: $</th>
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<tbody>
<tr>
<td><strong>Project Location</strong></td>
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**EXPERIENCE RECORD: (CONTINUED)**

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<td><strong>Project Description</strong></td>
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<td><strong>Project Location</strong></td>
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<tr>
<td>Contract Amount</td>
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<tr>
<td><strong>Project Owner (Firm/Agency)</strong></td>
</tr>
<tr>
<td>Address</td>
</tr>
<tr>
<td><strong>City</strong></td>
</tr>
<tr>
<td>State</td>
</tr>
<tr>
<td><strong>Project Owner’s Rep familiar with project</strong></td>
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<tr>
<td>Phone</td>
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<tr>
<td><strong>Email</strong></td>
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<tr>
<td><strong>Contract Start Date</strong></td>
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<tr>
<td>(Date of Notice to Proceed)</td>
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<tr>
<td>Contract Duration</td>
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<tbody>
<tr>
<td><strong>Project Description</strong></td>
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<tr>
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<tr>
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</tr>
<tr>
<td>A/E Phone</td>
</tr>
</tbody>
</table>
HUB AND TPWD CONTRACTING EXPERIENCE:

Please indicate if the firm is a Texas Certified Historically Underutilized Business (HUB): _____ YES _____ NO
If yes, please indicate gender and ethnicity:  Gender: _____ Male _____ Female
Ethnicity (Asian Pacific Islander, Black American, Hispanic American, Native American)
Service Disabled Veteran: _____ YES _____ NO

Has firm ever done business with TPWD? _____ YES _____ NO
If yes, list the most recent project number(s): ______________________________________
STATE OF TEXAS
COUNTY OF ________________

BEFORE ME, THE UNDERSIGNED AUTHORITY, on this day personally appeared ____________________, who being by me duly sworn, on oath says:

I hereby swear that the following constitutes a full and complete list of all enforcement actions filed against me or against owners for whom I have performed OSSF installations within the past five (5) years:

<table>
<thead>
<tr>
<th>Date:</th>
<th>Type:</th>
<th>Disposition:</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

(Add additional lines, if necessary, to list for additional enforcement actions)

SIGNED AND SWORN THIS _________ DAY OF ________________, 2019.

________________________________________________________________________

(Signature)

________________________________________________________________________

(Printed Name)

________________________________________________________________________

(Title)

SIGNED THIS _______ DAY OF ________________, 2019.

________________________________________________________________________

Notary Public, in and for, ______________ County, Texas

I hereby certify that all information provided above and attached is true and correct. Furthermore, I hereby authorize you to contact the references listed above and authorize release of information from such references to Texas Parks and Wildlife Department. I further certify that I can satisfy the licensing requirements set forth in Texas Administrative Code, Title 30, Chapter 285. I certify that my firm is not debarred or suspended from performing work for the U.S.A. or the State of Texas.

Name of Firm

Signature of Owner or Officer

Title of Person Signing

Date

COMPLETE ALL SECTIONS OF THIS FORM AND SUBMIT WITH BID.
HUB Subcontracting Plan (HSP) QUICK CHECKLIST

While this HSP Quick Checklist is being provided to merely assist you in readily identifying the sections of the HSP form that you will need to complete, it is very important that you adhere to the instructions in the HSP form and instructions provided by the contracting agency.

▶ If you will be awarding all of the subcontracting work you have to offer under the contract to only Texas certified HUB vendors, complete:

☐ Section 1 - Respondent and Requisition Information
☐ Section 2 a. - Yes, I will be subcontracting portions of the contract.
☐ Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors.
☐ Section 2 c. - Yes
☐ Section 4 - Affirmation
☐ GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.

▶ If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you do not have a continuous contract in place for more than five (5) years meets or exceeds the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:

☐ Section 1 - Respondent and Requisition Information
☐ Section 2 a. - Yes, I will be subcontracting portions of the contract.
☐ Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors.
☐ Section 2 c. - No
☐ Section 2 d. - Yes
☐ Section 4 - Affirmation
☐ GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.

▶ If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors or only to Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you do not have a continuous contract in place for more than five (5) years does not meet or exceed the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:

☐ Section 1 - Respondent and Requisition Information
☐ Section 2 a. - Yes, I will be subcontracting portions of the contract.
☐ Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors.
☐ Section 2 c. - No
☐ Section 2 d. - No
☐ Section 4 - Affirmation
☐ GFE Method B (Attachment B) - Complete an Attachment B for each of the subcontracting opportunities you listed in Section 2 b.

▶ If you will not be subcontracting any portion of the contract and will be fulfilling the entire contract with your own resources (i.e., employees, supplies, materials and/or equipment), complete:

☐ Section 1 - Respondent and Requisition Information
☐ Section 2 a. - No, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources.
☐ Section 3 - Self Performing Justification
☐ Section 4 - Affirmation

*Continuous Contract*: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service, to include under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered continuous contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.
HUB Subcontracting Plan (HSP)

In accordance with Texas Gov't Code §2161.252, the contracting agency has determined that subcontracting opportunities are probable under this contract. Therefore, all respondents, including State of Texas certified Historically Underutilized Businesses (HUBs) must complete and submit this State of Texas HUB Subcontracting Plan (HSP) with their response to the bid requisition (solicitation).

NOTE: Responses that do not include a completed HSP shall be rejected pursuant to Texas Gov't Code §2161.252(b).

The HUB Program promotes equal business opportunities for economically disadvantaged persons to contract with the State of Texas in accordance with the goals specified in the 2009 State of Texas Disparity Study. The statewide HUB goals defined in 34 Texas Administrative Code (TAC) §20.284 are:

- 11.2 percent for heavy construction other than building contracts,
- 21.1 percent for all building construction, including general contractors and operative builders' contracts,
- 32.9 percent for all special trade construction contracts,
- 23.7 percent for professional services contracts,
- 26.0 percent for all other services contracts, and
- 21.1 percent for commodities contracts.

--- Agency Special Instructions/Additional Requirements ---

In accordance with 34 TAC §20.285(6)(1)(D)(iii), a respondent (prime contractor) may demonstrate good faith effort to utilize Texas certified HUBs for its subcontracting opportunities if the total value of the respondent's subcontracts with Texas certified HUBs meets or exceeds the statewide HUB goal or the agency specific HUB goal, whichever is higher. When a respondent uses this method to demonstrate good faith effort, the respondent must identify the HUBs with which it will subcontract. If using existing contracts with Texas certified HUBs to satisfy this requirement, only the aggregate percentage of the contracts expected to be subcontracted to HUBs with which the respondent does not have a continuous contract* in place for more than five (5) years shall qualify for meeting the HUB goal. This limitation is designed to encourage vendor rotation as recommended by the 2009 Texas Disparity Study.

If you are completing Method B (Attachment B) of the HSP, please provide all supporting documentation pertaining to the notifications of a minimum of three (3) Texas-certified HUBs and two (2) minority, women, or service-disabled veteran trade organizations or development centers for each subcontracting opportunity listed in Section 2, Item b. Such supporting documentation would include all e-mails, faxes, delivery receipts, confirmation receipts/pages, attachments, etc.

For questions regarding the HSP, please contact TPWD HUB Administration at 512-389-4784 or hub@tpwd.texas.gov.

SECTION 1: RESPONDENT AND REQUISITION INFORMATION

a. Respondent (Company) Name: ____________________________  State of Texas VID #: ____________________________
   Point of Contact: ____________________________  Phone #: ____________________________
   E-mail Address: ____________________________  Fax #: ____________________________

b. Is your company a State of Texas certified HUB? □ - Yes □ - No

c. Requisition #: ____________________________  Bid Open Date: [mm/dd/yyyy]
SECTION 2: RESPONDENT'S SUBCONTRACTING INTENTIONS

After dividing the contract work into reasonable lots or portions to the extent consistent with prudent industry practices, and taking into consideration the scope of work to be performed under the proposed contract, including all potential subcontracting opportunities, the respondent must determine what portions of work, including contracted staffing, goods and services will be subcontracted. Note: In accordance with 34 TAC §23.282, a "Subcontractor" means a person who contracts with a prime contractor to work, to supply commodities, or to contribute toward completing work for a governmental entity.

a. Check the appropriate box (Yes or No) that identifies your subcontracting intentions:

- Yes, I will be subcontracting portions of the contract. (If Yes, complete Item b of this SECTION and continue to Item c of this SECTION.)
- No, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources, including employees, goods and services. (If No, continue to SECTION 3 and SECTION 4.)

b. List all the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to reward to vendors that are not a Texas certified HUB (i.e., Non-HUB).

<table>
<thead>
<tr>
<th>Item #</th>
<th>Subcontracting Opportunity Description</th>
<th>HUBs</th>
<th>Non-HUBs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage of the contract expected to be subcontracted to HUBs with which you do not have a continuous contract in place for more than five (5) years.</td>
<td>%</td>
<td>%</td>
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</table>

Aggregate percentages of the contract expected to be subcontracted: %

(Note: If you have more than fifteen subcontracting opportunities, a continuation sheet is available online at https://www.comptroller.texas.gov/purchasing/vendor/hubforms.php).

c. Check the appropriate box (Yes or No) that indicates whether you will be using only Texas certified HUBs to perform all of the subcontracting opportunities you listed in SECTION 2, Item b.

- Yes (If Yes, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed.)
- No (If No, continue to Item d, of this SECTION.)

d. Check the appropriate box (Yes or No) that indicates whether the aggregate expected percentage of the contract you will subcontract with Texas certified HUBs with which you do not have a continuous contract in place for more than five (5) years, meets or exceeds the HUB goal the contracting agency identified on page 1 in the "Agency Special Instructions/Additional Requirements."

- Yes (If Yes, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed.)
- No (If No, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method B (Attachment B)" for each of the subcontracting opportunities you listed.)

"Continuous Contract: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.
SECTION 2: RESPONDENT'S SUBCONTRACTING INTENTIONS (CONTINUATION SHEET)

This page can be used as a continuation sheet to the HSP Form's page 2, Section 2, Item b. Continue listing the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e., Non-HUB).

<table>
<thead>
<tr>
<th>Item #</th>
<th>Subcontracting Opportunity Description</th>
<th>HUBs</th>
<th>Non-HUBs</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Percentage of the contract expected to be subcontracted to HUBs with which you expect to have a continuous contract in place for more than five (5) years</td>
<td>%</td>
<td>%</td>
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<td></td>
<td>Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract in place for more than five (5) years</td>
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<td>Percentage of the contract expected to be subcontracted to non-HUBs</td>
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<td>Aggregate percentages of the contract expected to be subcontracted:</td>
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<td>Percentage of the contract expected to be subcontracted to non-HUBs:</td>
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*Continuous Contract: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

HSP – SECTION 2
(Continuation Sheet)
SECTION 3: SELF PERFORMING JUSTIFICATION (If you responded "No" to SECTION 2, Item a, you must complete this SECTION and continue to SECTION 4.) If you responded "No" to SECTION 2, Item a, in the space provided below explain how your company will perform the entire contract with its own employees, supplies, materials and/or equipment.

---

SECTION 4: AFFIRMATION

As evidenced by my signature below, I affirm that I am an authorized representative of the respondent listed in SECTION 1, and that the information and supporting documentation submitted with the HSP is true and correct. Respondent understands and agrees that, if awarded any portion of the requisition:

- The respondent will provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor for the awarded contract. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.

- The respondent must submit monthly compliance reports (Prime Contractor Progress Assessment Report – PAR) to the contracting agency, verifying its compliance with the HSP, including the use of and expenditures made to its subcontractors (HUBs and Non-HUBs). (The PAR is available at https://www.comptroller.texas.gov/purchasing/docs/hub-forms/ProgressAssessmentReportForm.xls).

- The respondent must seek approval from the contracting agency prior to making any modifications to its HSP, including the hiring of additional or different subcontractors and the termination of a subcontractor the respondent identified in its HSP. If the HSP is modified without the contracting agency's prior approval, respondent may be subject to any and all enforcement remedies available under the contract or otherwise available by law, up to and including debarment from all state contracting.

- The respondent must, upon request, allow the contracting agency to perform on-site reviews of the company's headquarters and/or work-site where services are being performed and must provide documentation regarding staffing and other resources.

_________________________ ___________________________ ____________________
Signature Printed Name Title
Date (MM/DD/YYYY)

Reminder:

➢ If you responded "Yes" to SECTION 2, Items c or d, you must complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.

➢ If you responded "No" SECTION 2, Items c and d, you must complete an "HSP Good Faith Effort - Method B (Attachment B)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.
**HSP Good Faith Effort - Method A (Attachment A)**

Enter your company's name here: ___________________________  Requisition #: ___________________________

**IMPORTANT**: If you responded "Yes" to SECTION 2, Items c or d of the completed HSP form, you must submit a completed "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed in SECTION 2, Item b of the completed HSP form. You may photo-copy this page or download the form at [https://www.comptroller.texas.gov/purchasing/docs/hub-forms/hub-sbcont-plan-dtc-adrn-a.pdf](https://www.comptroller.texas.gov/purchasing/docs/hub-forms/hub-sbcont-plan-dtc-adrn-a.pdf)

**SECTION A-1: SUBCONTRACTING OPPORTUNITY**

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b, of the completed HSP form for which you are completing the attachment.

Item Number: _____  Description: ___________________________

**SECTION A-2: SUBCONTRACTOR SELECTION**

List the subcontractor(s) you selected to perform the subcontracting opportunity you listed above in SECTION A-1. Also identify whether they are a Texas certified HUB and their Texas Vendor Identification (VID) Number or federal Employer Identification Number (EIN), the approximate dollar value of the work to be subcontracted, and the expected percentage of work to be subcontracted. When searching for Texas certified HUBs and verifying their HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) - Historically Underutilized Business (HUB) Directory Search located at [http://wuroa.ons.state.tx.us/transactions/search/index.jsp](http://wuroa.ons.state.tx.us/transactions/search/index.jsp). HUB status code "A" signifies that the company is a Texas certified HUB.

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<tr>
<th>Company Name</th>
<th>Texas certified HUB</th>
<th>Texas VID or federal EIN</th>
<th>Approximate Dollar Amount</th>
<th>Expected Percentage of Contract</th>
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**REMEMBER**: As specified in SECTION 4 of the completed HSP form, if you (respondent) are awarded any portion of the requisition, you are required to provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor. The notice must specify at a minimum the subcontracting opportunity and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.

Page 1 of 1  
(Attachment A)
HSP Good Faith Effort - Method B (Attachment B)

Enter your company's name here: ____________________________  Requisition #: ______

IMPORTANT: If you responded "No" to SECTION 2, Items c and d of the completed HSP form, you must submit a completed "HSP Good Faith Effort - Method B (Attachment B)" for each subcontracting opportunity you listed in SECTION 2, Item b of the completed HSP form. You may photo-copy this page or download the form at [https://www.comptroller.texas.gov/purchasing/docs/hub-forms/hub-sbcont-plan-gfe-achm-b.pdf].

SECTION B-1: SUBCONTRACTING OPPORTUNITY
Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b, of the completed HSP form for which you are completing the attachment.

Item Number: ____  Description: ____________________________

SECTION B-2: MENTOR PROTÈGÉ PROGRAM
If respondent is participating as a Mentor in a State of Texas Mentor Protégé Program, submitting its Protégé (Protégé must be a State of Texas certified HUB) as a subcontractor to perform the subcontracting opportunity listed in SECTION B-1, constitutes a good faith effort to subcontract with a Texas certified HUB towards that specific portion of work.

Check the appropriate box (Yes or No) that indicates whether you will be subcontracting the portion of work you listed in SECTION B-1 to your Protégé.

☐ - Yes (If Yes, continue to SECTION B-4.)

☐ - No / Not Applicable (If No or Not Applicable, continue to SECTION B-3 and SECTION B-4.)

SECTION B-3: NOTIFICATION OF SUBCONTRACTING OPPORTUNITY
When completing this section you MUST comply with items a, b, c and d, thereby demonstrating your Good Faith Effort of having notified Texas certified HUBs and trade organizations or development centers about the subcontracting opportunity you listed in SECTION B-1. Your notice should include the scope of work, information regarding the location to review plans and specifications, bonding and insurance requirements, required qualifications, and identify a contact person. When sending notice of your subcontracting opportunity, you are encouraged to use the attached HUB Subcontracting Opportunity Notification form, which is also available online at [https://www.comptroller.texas.gov/purchasing/docs/hub-forms/HUBSubcontractingOpportunityNotificationForm.pdf].

Retain supporting documentation (i.e., certified letter, fax, e-mail) demonstrating evidence of your good faith effort to notify the Texas certified HUBs and trade organizations or development centers. Also, be mindful that a working day is considered a normal business day of a state agency, not including weekends, federal or state holidays, or days the agency is declared closed by its executive officer. The initial day the subcontracting opportunity notice is sent/provided to the HUBs and to the trade organizations or development centers is considered to be "day zero" and does not count as one of the seven (7) working days.

a. Provide written notification of the subcontracting opportunity you listed in SECTION B-1, to three (3) or more Texas certified HUBs. Unless the contracting agency specified a different time period, you must allow the HUBs at least seven (7) working days to respond to the notice prior to you submitting your bid response to the contracting agency. When searching for Texas certified HUBs and verifying their HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) - Historically Underutilized Business (HUB) Directory Search located at [http://mygpa.org/state.tx.us/hubdirectory/search/index.jsp]. HUB status code "A" signifies that the company is a Texas certified HUB.

b. List the three (3) Texas certified HUBs you notified regarding the subcontracting opportunity you listed in SECTION B-1. Include the company's Texas Vendor Identification (VID) Number, the date you sent notice to that company, and indicate whether it was responsive or non-responsive to your subcontracting opportunity notice.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Texas VID (find under [Vendor Security Numbers])</th>
<th>Date Notice Sent to HUB(s)</th>
<th>Did the HUB Respond?</th>
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</table>

C. Provide written notification of the subcontracting opportunity you listed in SECTION B-1 to two (2) or more trade organizations or development centers in Texas to assist in identifying potential HUBs by disseminating the subcontracting opportunity to their members/participants. Unless the contracting agency specified a different time period, you must provide your subcontracting opportunity notice to trade organizations or development centers at least seven (7) working days prior to submitting your bid response to the contracting agency. A list of trade organizations and development centers that have expressed an interest in receiving notices of subcontracting opportunities is available on the Statewide HUB Program's webpage at [https://www.comptroller.texas.gov/purchasing/vendor/hubresources.php].

d. List two (2) trade organizations or development centers you notified regarding the subcontracting opportunity you listed in SECTION B-1. Include the date when you sent notice to it and indicate if it accepted or rejected your notice.

<table>
<thead>
<tr>
<th>Trade Organizations or Development Centers</th>
<th>Date Notice Sent to T/O</th>
<th>Was the Notice Accepted?</th>
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<td>- Yes ☐ - No ☐</td>
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<td>- Yes ☐ - No ☐</td>
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Page 1 of 2
(Attachment B)
**SECTION B-4: SUBCONTRACTOR SELECTION**

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b, of the completed HSP form for which you are completing the attachment.

a. Enter the item number and description of the subcontracting opportunity for which you are completing this Attachment B continuation page.

   Item Number: ______  Description: ________________________

b. List the subcontractor(s) you selected to perform the subcontracting opportunity you listed in SECTION B-1. Also identify whether they are a Texas certified HUB and their Texas Vendor Identification (VID) Number or federal Employer Identification Number (EIN), the approximate dollar value of the work to be subcontracted, and the expected percentage of work to be subcontracted. When searching for Texas certified HUBs and verifying their HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL): Historically Underutilized Business (HUB) Directory Search located at [http://myceo.cpa.state.tx.us/txassmbld/mb/index.jsp](http://myceo.cpa.state.tx.us/txassmbld/mb/index.jsp). HUB status code "A" signifies that the company is a Texas certified HUB.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Texas certified HUB</th>
<th>Texas VID or federal EIN</th>
<th>Approximate Dollar Amount</th>
<th>Expected Percentage of Contract</th>
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If any of the subcontractors you have selected to perform the subcontracting opportunity you listed in SECTION B-1 is not a Texas certified HUB, provide written justification for your selection process (attach additional page if necessary):

**REMEMBER:** As specified in SECTION 4 of the completed HSP form, if you (respondent) are awarded any portion of the requisition, you are required to provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity if (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.
HUB Subcontracting Opportunity Notification Form

In accordance with Texas Gov't Code, Chapter 2161, each state agency that considers entering into a contract with an expected value of $100,000 or more shall, before the agency solicits bids, proposals, offers, or other applicable expressions of interest, determine whether subcontracting opportunities are probable under the contract. The state agency has determined that subcontracting opportunities are probable under the requisition to which my company will be responding.

34 Texas Administrative Code, §20.285 requires all respondents (prime contractors) bidding on the contract to provide notice of each of their subcontracting opportunities to at least three (3) Texas certified HUBs (who work within the respective industry applicable to the subcontracting opportunity), and allow the HUBs at least seven (7) working days to respond to the notice prior to accepting the response to the contracting agency. In addition, at least seven (7) working days prior to submitting its bid to the contracting agency, the respondent must provide notice of each of its subcontracting opportunities to two (2) or more trade organizations or development centers (in Texas) that serve members of groups (i.e., Asian Pacific American, Black American, Hispanic American, Native American, Woman, Service Disabled Veteran) and/or the state agency identified in the Texas Administrative Code §20.282(19)(C).

We respectfully request that vendors interested in bidding on the subcontracting opportunity scope of work identified in Section C, Item 2, reply no later than the date and time identified in Section C, Item 1. Submit your response to the point-of-contact referenced in Section A.

<table>
<thead>
<tr>
<th>SECTION A: PRIME CONTRACTOR'S INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name: ___________________________</td>
</tr>
<tr>
<td>Point-of-Contact: ________________________</td>
</tr>
<tr>
<td>E-mail Address: _________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION B: CONTRACTING STATE AGENCY AND REQUISITION INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency Name: ___________________________</td>
</tr>
<tr>
<td>Point-of-Contact: ________________________</td>
</tr>
<tr>
<td>Requisition #: __________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION C: SUBCONTRACTING OPPORTUNITY RESPONSE DUE DATE, DESCRIPTION, REQUIREMENTS AND RELATED INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Potential Subcontractor's Bid Response Due Date:</td>
</tr>
<tr>
<td>If you would like for our company to consider your company's bid for the subcontracting opportunity identified below in Item 2, we must receive your bid response no later than on __________________________ on Central Time ________________________ Date (mm/dd/yyyy) ________________________ in accordance with 34 TAC §20.285, each notice of subcontracting opportunity shall be provided to at least three (3) Texas certified HUBs, and allow the HUBs at least seven (7) working days to respond to the notice prior to submitting our bid response to the contracting agency. In addition, at least seven (7) working days prior to submitting our bid response to the contracting agency, we must provide notice of each of our subcontracting opportunities to two (2) or more trade organizations or development centers (in Texas) that serve members of groups (i.e., Asian Pacific American, Black American, Hispanic American, Native American, Woman, Service Disabled Veteran) identified in Texas Administrative Code, §20.282(19)(C).</td>
</tr>
<tr>
<td>(A working day is considered a normal business day of a state agency, not including weekends, federal or state holidays, or days the agency is declared closed by its executive officer. The initial day the subcontracting opportunity notice is sent/provided to the HUBs and to the trade organizations or development centers is considered to be &quot;day zero&quot; and does not count as one of the seven (7) working days.)</td>
</tr>
</tbody>
</table>

| 2. Subcontracting Opportunity Scope of Work: |

| 3. Required Qualifications: |
|  - Not Applicable |

| 4. Bonding/Insurance Requirements: |
|  - Not Applicable |

| 5. Location to review plans/specifications: |
|  - Not Applicable |
Infrastructure HUB Subcontracting Opportunities


In accordance with Texas Administrative Code, Title 34, Part 1, Chapter 20, Subchapter D, Division 1, state agencies shall make a good faith effort to utilize Historically Underutilized Businesses (HUBs) in contracts for Construction, Services (including Professional and Consulting Services), and Commodity procurements. The State of Texas Policy is to contract directly with HUBs or indirectly through subcontracting opportunities. Each Contractor/Vendor shall also make a good faith effort to utilize HUBs in subcontracting opportunities.

TPWD estimates the value of this contract to be $1,120,000 to 1,320,000 and further sets the HUB subcontracting goal at 21.1% of the contract’s value.

(Subcontractor - A person who contracts with a vendor to work, to supply commodities, or contribute toward completing work for a governmental entity as defined in Texas Government Code 2251.001.)

NOTE: The following list identifies potential subcontracting opportunities. You could have other opportunities or may self-perform some opportunities. You are not required to subcontract every potential subcontracting opportunity.

<table>
<thead>
<tr>
<th>Class &amp; Item Code</th>
<th>Trades/Disciplines/Major Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>150-49</td>
<td>MILLWORK: COUNTERS, CABINETS, SHELVES, STAIRS, ETC.</td>
</tr>
<tr>
<td>912-40</td>
<td>CONSTRUCTION SERVICES, DEMOLITION</td>
</tr>
<tr>
<td>914-27</td>
<td>CARPENTRY SERVICES, NEW CONST.</td>
</tr>
<tr>
<td>914-30</td>
<td>CONCRETE SERVICES, NEW CONST.</td>
</tr>
<tr>
<td>914-38</td>
<td>ELECTRICAL SERVICES, NEW CONSTRUCTION</td>
</tr>
<tr>
<td>914-50</td>
<td>HVAC SERVICES, NEW CONSTRUCTION</td>
</tr>
<tr>
<td>988-52</td>
<td>DESIGN AND PLANTING SERVICES, LANDSCAPE</td>
</tr>
<tr>
<td>968-78</td>
<td>SEPTIC TANK INSTALLATION, REMOVAL, DISPOSAL AND RELATED SERVICES</td>
</tr>
<tr>
<td>914-73</td>
<td>CONSTRUCTION SERVICES, ROOFING AND SIDING, NEW</td>
</tr>
<tr>
<td>914-68</td>
<td>PLUMBING SERVICES, NEW CONST.</td>
</tr>
<tr>
<td>914-61</td>
<td>CONSTRUCTION SERVICES, PAINTING, NEW</td>
</tr>
<tr>
<td>914-80</td>
<td>CONSTRUCTION SERVICES, STUCCO, NEW</td>
</tr>
<tr>
<td>914-79</td>
<td>CONSTRUCTION SERVICES, STRUCTURAL STEEL, NEW</td>
</tr>
<tr>
<td>914-88</td>
<td>CONSTRUCTION SERVICES, WOOD, NEW</td>
</tr>
<tr>
<td>914-64</td>
<td>CONSTRUCTION SERVICES, PLASTERING, NEW</td>
</tr>
<tr>
<td>909-30</td>
<td>BUILDING CONSTRUCTION, (NOT OTHERWISE CLASSIFIED)</td>
</tr>
<tr>
<td>962-39</td>
<td>HAULING SERVICES</td>
</tr>
</tbody>
</table>

HUB LIST:
TPWD does not endorse, recommend or attest to the capabilities of any company or individual listed. The list is strictly provided as a convenience to respondents.

Respondents may also access a list of HUB subcontractors by referencing the above Class and Item codes in a Centralized Master Bidders List (CMBL) search at [https://mycpa.cpa.state.tx.us/tpasscmblsearch/index.jsp](https://mycpa.cpa.state.tx.us/tpasscmblsearch/index.jsp).


A few minority and women trade organizations and development centers are listed below. For a more complete list, please visit [https://www.comptroller.texas.gov/purchasing/vendor/hub/resources.php](https://www.comptroller.texas.gov/purchasing/vendor/hub/resources.php).

**Women Contractors Association**
6703 Chimney Rock Rd.
Bellaire, TX 77401
(703) 807-9977 phone
director@womencontractors.org email
[www.womencontractors.org](http://www.womencontractors.org) website

**Texas Association of African American Chambers of Commerce**
807 Brazos St., Ste. 710
Austin, TX 78701
(512) 535-5610 phone
cro@taaacc.org email
[www.taaacc.org](http://www.taaacc.org) website

**US Pan Asian American Chamber of Commerce**
711 E. Lamar Blvd., Mailbox 103A
Arlington, TX 76011
(822) 323-5869 phone

**Dallas/Fort Worth Minority Supplier Development Council**
8828 N. Stemmons Fwy, Ste. 550
Dallas, TX 75247
(214) 630-0747 phone
(214) 637-2241 fax

**US India Chamber of Commerce DFW**
5930 LBJ Fwy, Ste. 310
Dallas, TX 75240
(214) 346-9559 phone
(214) 346-9521 fax
info@usicoc.org email
<table>
<thead>
<tr>
<th>Email/Website</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:gmcdermott@uspaacc-sw.org">gmcdermott@uspaacc-sw.org</a></td>
<td>Email</td>
</tr>
<tr>
<td><a href="http://www.uspaacc-sw.org">www.uspaacc-sw.org</a></td>
<td>Website</td>
</tr>
<tr>
<td><a href="mailto:sourcing@dfwmsdc.com">sourcing@dfwmsdc.com</a></td>
<td>Email</td>
</tr>
<tr>
<td><a href="http://www.dfwmsdc.com">www.dfwmsdc.com</a></td>
<td>Website</td>
</tr>
<tr>
<td><a href="http://www.usicoc.biz">www.usicoc.biz</a></td>
<td>Website</td>
</tr>
</tbody>
</table>

For information on the TPWD HUB program, assistance with completing forms, or to obtain HUB lists if web access is not possible, please contact the TPWD HUB staff at (512) 389-4784 or hub@tpwd.texas.gov.
Persons signing this form should refer to the regulations referenced below for complete instructions:

Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions - The prospective primary participant further agrees by submitting this proposal that it will include the clause titled, "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions. See below for language to be used or use this form certification and sign. (See Appendix A of Subpart D of 43 CFR Part 12.)

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions - (See Appendix B of Subpart D of 43 CFR Part 12.)

Certification Regarding Drug-Free Workplace Requirements - Alternate I. (Grantees Other Than Individuals) and Alternate II. (Grantees Who are Individuals) - (See Appendix C of Subpart D of 43 CFR Part 12)

Signature on this form provides for compliance with certification requirements under 43 CFR Parts 12 and 18. The certifications shall be treated as a material representation of fact upon which reliance will be placed when the Department of the Interior determines to award the covered transaction, grant, cooperative agreement or loan.

PART A: Certification Regarding Debarment, Suspension, and Other Responsibility Matters-
Primary Covered Transactions

CHECK if this certification is for a primary covered transaction and is applicable.

(1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

PART B: Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -
Lower Tier Covered Transactions

CHECK if this certification is for a lower tier covered transaction and is applicable.

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.
PART C: Certification Regarding Drug-Free Workplace Requirements

CHECK___IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS NOT AN INDIVIDUAL.

Alternate I. (Grantees Other Than Individuals)

A. The grantee certifies that it will or continue to provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing an ongoing drug-free awareness program to inform employees about—
   (1) The dangers of drug abuse in the workplace;
   (2) The grantee's policy of maintaining a drug-free workplace;
   (3) Any available drug counseling, rehabilitation, and employee assistance programs; and
   (4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will—
   (1) Abide by the terms of the statement; and
   (2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(e) Notifying the agency in writing, within ten calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(f) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee who is so convicted—
   (1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
   (2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a) (b), (c), (d), (e) and (f).

B. The grantee may insert in the space provided below the site(s) for the performance of work done in connection with the specific grant:

Place of Performance (Street address, city, county, state, zip code)

________________________________________

Check___ if there are workplaces on files that are not identified here.

PART D: Certification Regarding Drug-Free Workplace Requirements

CHECK___IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS AN INDIVIDUAL.

Alternate II. (Grantees Who Are Individuals)

(a) The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in conducting any activity with the grant;

(b) If convicted of a criminal drug offense resulting from a violation occurring during the conduct of any grant activity, he or she will report the conviction, in writing, within 10 calendar days of the conviction, to the grant officer or other designee, unless the Federal agency designates a central point for the receipt of such notices. When notice is made to such a central point, it shall include the identification number(s) of each affected grant.
PART E: Certification Regarding Lobbying
Certification for Contracts, Grants, Loans, and Cooperative Agreements

CHECK____ IF CERTIFICATION IS FOR THE AWARD OF ANY OF THE FOLLOWING AND
THE AMOUNT EXCEEDS $100,000: A FEDERAL GRANT OR COOPERATIVE AGREEMENT;
SUBCONTRACT, OR SUBGRANT UNDER THE GRANT OR COOPERATIVE AGREEMENT.

CHECK____ IF CERTIFICATION FOR THE AWARD OF A FEDERAL
LOAN EXCEEDING THE AMOUNT OF $150,000, OR A SUBGRANT OR
SUBCONTRACT EXCEEDING $100,000, UNDER THE LOAN.

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for
influencing or attempting to influence an officer or employee of an agency, a Member of Congress, and officer or employee
of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making
of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension,
continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting
to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an
employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the
undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its
instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at
all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all
subrecipients shall certify accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered
into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title
31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000
and not more than $100,000 for each such failure.

As the authorized certifying official, I hereby certify that the above specified certifications are true.

________________________________________
SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL

________________________________________
TYPED NAME AND TITLE

________________________________________
DATE

DI-2010
June 1995
(This form replaces DI-1903, Ell-1954,
DI-1956, DI-1966 and DI-1963)
NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the Awarding Agency. Further, certain Federal assistance awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duty authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the assistance; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will not dispose of, modify the use of, or change the terms of the real property title, or other interest in the site and facilities without permission and instructions from the awarding agency. Will record the Federal interest in the title of real property in accordance with awarding agency directives and will include a covenant in the title of real property acquired in whole or in part with Federal assistance funds to assure non-discrimination during the useful life of the project.

4. Will comply with the requirements of the assistance awarding agency with regard to the drafting, review and approval of construction plans and specifications.

5. Will provide and maintain competent and adequate engineering supervision at the construction site to ensure that the complete work conforms with the approved plans and specifications and will furnish progress reports and such other information as may be required by the assistance awarding agency or State.

6. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

7. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

8. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

9. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.

10. Will comply with all Federal statutes relating to non-discrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.
11. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal and federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

12. Will comply with the provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.


14. Will comply with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

15. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).


18. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."

19. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.
**DISCLOSURE OF LOBBYING ACTIVITIES**

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

<table>
<thead>
<tr>
<th>1. Type of Federal Action:</th>
<th>2. Status of Federal Action</th>
<th>3. Report Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. contract</td>
<td>a. bid/offer/application</td>
<td>a. initial filing</td>
</tr>
<tr>
<td>b. grant</td>
<td>b. initial award</td>
<td>b. material change</td>
</tr>
<tr>
<td>c. cooperative agreement</td>
<td>c. post-award</td>
<td></td>
</tr>
<tr>
<td>d. loan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. loan guarantee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. loan insurance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. Name and Address of Reporting Entity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Prime</td>
</tr>
<tr>
<td>☐ Subawardee</td>
</tr>
<tr>
<td>Tier __________, if known:</td>
</tr>
</tbody>
</table>

Congressional District, if known: ____________________________

<table>
<thead>
<tr>
<th>5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime:</th>
</tr>
</thead>
</table>

Federal Department/Agency: ____________________________

Congressional District, if known: ____________________________

Federal Program Name/Description: ____________________________

CFDA Number, if applicable: ____________________________

<table>
<thead>
<tr>
<th>8. Federal Action Number, if known:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>9. Award Amount, if known:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>10. a. Name and Address of Lobbying Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(if individual, last name, first name, MI):</td>
</tr>
</tbody>
</table>

| b. Individuals Performing Services (including address of different from No. 10a.) |
| (last name, first name, MI): |

(attach Continuation Sheet(s) SF-LLL-A, if necessary)

<table>
<thead>
<tr>
<th>11. Amount of Payment (check all that apply):</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>12. Form of Payment (check all that apply):</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>13. Type of Payment (check all that apply):</th>
</tr>
</thead>
</table>

| 14. Brief Description of Services Performed or to be Performed and Date(s) of Service, including officer(s), employee(s), or Member(s) contacted, for Payment indicated in Item 11.: |

(attach Continuation Sheet(s) SF-LLL-A, if necessary)

<table>
<thead>
<tr>
<th>15. Continuation Sheet(s) SF-LLL-A attached:</th>
</tr>
</thead>
</table>

| 16. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure. |

Signature: ____________________________

Print Name: ____________________________

Title: ____________________________

Telephone No.: ____________________________ Date: ____________________________

Federal Use Only: Authorized for Local Reproduction Standard Form - LLL
INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subawardee recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

   (b) Enter the full names of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, and Middle Name (MI).

11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minute per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.
CONDITIONS
OF THE
CONTRACT
Uniform General Conditions for State of Texas Construction Contracts

Including Supplementary General Conditions for Projects Administered by the Texas Parks and Wildlife Department

TEXAS PARKS & WILDLIFE
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Article 1. Definitions

Unless the context clearly requires another meaning, the following terms have the meaning assigned herein.

1.1 *Addendum/Addenda* means formally issued written or graphic modifications and/or interpretations of the Construction Documents that may add to, delete from, clarify or correct the description and/or scope of the Work. Addenda are issued during the bidding phase of the project.

1.2 *Application for Payment* means Contractor’s monthly partial invoice for payment that includes any portion of the Work that has been completed for which an invoice has not been submitted and performed in accordance with the requirements of the Contract Documents. The Application for Payment accurately reflects the progress of the Work, is itemized based on the Schedule of Values, bears the notarized signature of Contractor, and shall not include subcontracted items for which Contractor does not intend to pay.

1.3 *Application for Final Payment* means Contractor’s final invoice for payment that includes any portion of the Work that has been completed for which an invoice has not been submitted, amounts owing to adjustments to the final Contract Sum resulting from approved change orders, and release of remaining Contractor’s retainage.

1.4 *Architect/Engineer (A/E)* means a person registered as an architect pursuant to Tex. Occ. Code Ann., Ch. 1051, as a landscape architect pursuant to Tex. Occ. Code Ann., Ch. 1052, a person licensed as a professional engineer pursuant Tex. Occ. Code Ann., Ch. 1001, and/or a firm employed by Owner or Design-Build Contractor to provide professional architectural or engineering services and to exercise overall responsibility for the design of a Project or a significant portion thereof, and to perform the contract administration responsibilities set forth in the Contract.

1.5 *As-Built Drawings and Specifications* means the drawing set, specifications and other materials prepared by the Contractor, in the field, that documents the changes made by the contractor. Collectively, these are also called “red-lines” or “as-builts.”

1.6 *Authority Having Jurisdiction* means a federal, state, local, or other regional department, or an individual such as a fire marshal, building official, electrical inspector, utility provider or other individual having statutory authority.

1.7 *Baseline Schedule* means the initial time schedule prepared by Contractor for Owner’s information and acceptance that conveys Contractor’s and Subcontractors’ activities (including coordination and review activities required in the Contract Documents to be performed by A/E and ODR), durations, and sequence of work related to the entire Project to the extent required by the Contract Documents. The schedule clearly demonstrates the critical path of activities, durations and necessary predecessor conditions that drive the end date of the schedule. The Baseline Schedule shall not exceed the time limit current under the Contract Documents.
1.8 *Certificate of Final Completion* means the certificate issued by TPWD that includes certification by the A/E that documents, to the best of A/E's knowledge and understanding, Contractor's completion of all Contractor's Punchlist items and pre-final Punchlist items, final cleanup and Contractor's provision of Record-As-Built Documents, operations and maintenance manuals, and all other closeout documents required by the Contract Documents. *Additional documentation may be required by TPWD for consideration of the Contractor's Application for Final Payment.*

1.9 *Certificate of Substantial Completion* means the certificate executed by the A/E, ODR and Contractor that documents to the best of A/E's and ODR's knowledge and understanding, Contractor's sufficient completion of the work in accordance with the Contract, so as to be operational and fit for the use intended.

1.10 *Change Order* means a written modification of the Contract between Owner and Contractor, signed by Owner, Contractor, and A/E.

1.11 *Close-out Documents* mean the product brochures, submittals, product/equipment maintenance and operations instructions, manuals, and other documents/warranties, record As-Built documents, affidavit of payment, release of lien and claim, and as may be further defined, identified, and required by the Contract Documents.

1.12 *Contract* means the entire agreement between Owner and Contractor, including all of the Contract Documents.

1.13 *Contract Date* is the date when the agreement between Owner and Contractor becomes effective.

1.14 *Contract Documents* mean those documents identified as a component of the agreement (Contract) between Owner and Contractor. These may include, but are not limited to, Drawings; Specifications; General, Supplementary General, and Special Conditions; and all pre-bid and/or pre-proposal addenda.

1.15 *Contract Sum* means the total compensation payable to Contractor for completion of the Work in accordance with the terms of the Contract.

1.16 *Contract Time* means the period between the start date identified in the Notice to Proceed with construction and the Substantial Completion date identified in the Notice to Proceed or as subsequently amended by a Change Order.

1.17 *Contractor* means the individual, corporation, limited liability company, partnership, firm, or other entity contracted to perform the Work, regardless of the type of construction contract used, so that the term as used herein includes a Construction Manager-at-Risk or a Design-Build firm as well as a general or prime Contractor. The Contract Documents refer to Contractor as if singular in number.

1.18 *Construction Documents* mean the Drawings, Specifications, and other documents issued to build the Project. Construction Documents become part of the Contract Documents when listed in the Contract or any Change Order.
1.19 Construction Manager-at-Risk, in accordance with Tex. Gov’t Code, Ch. 2166, means a sole proprietorship, partnership, corporation, or other legal entity that assumes the risk for construction, rehabilitation, alteration, or repair of a facility at the contracted price as a general contractor and provides consultation to Owner regarding construction during and after the design of the facility.

1.20 Date of Commencement means the date designated in the Notice to Proceed for Contractor to commence the Work.

1.21 Day means a calendar day unless otherwise specifically stipulated.

1.22 Design-Build means a project delivery method in which the detailed design and subsequent construction is provided through a single contract with a Design-Build firm; a team, partnership, or legal entity that includes design professionals and a builder. The Design-Build Project delivery shall be implemented in accordance with Tex. Gov’t Code § 2166.2531.

1.23 Drawings mean that product of A/E which graphically depicts the Work.

1.24 Final Completion means the date determined and certified by A/E and Owner on which the Work is fully and satisfactorily complete in accordance with the Contract.

1.25 Final Payment means the last and final monetary compensation made to Contractor for any portion of the Work that has been completed and accepted for which payment has not been made, amounts owing to adjustments to the final Contract Sum resulting from approved change orders, and release of Contractor’s retainage.

1.26 Historically Underutilized Business (HUB) pursuant to Tex. Gov’t Code, Ch. 2161, means a business that is at least 51% owned by an Asian Pacific American, a Black American, a Hispanic American, a Native American and/or an American Woman; is an entity with its principal place of business in Texas; and has an owner residing in Texas with proportionate interest that actively participates in the control, operations, and management of the entity’s affairs.

1.27 Notice to Proceed (NTP) means written document informing Contractor of the dates beginning Work and the dates anticipated for Substantial Completion.

1.28 Open Item List means a list of work activities, Punchlist items, changes or other issues that are not expected by Owner and Contractor to be complete prior to Substantial Completion.

1.29 Owner means the State of Texas, and any agency of the State of Texas, acting through the responsible entity of the State of Texas identified in the Contract as Owner. Owner herein shall mean the Texas Parks and Wildlife Department.

1.30 Owner’s Designated Representative (ODR) means the individual assigned by Owner to act on its behalf and to undertake certain activities as specifically outlined in the Contract. ODR is the only party authorized to direct changes to the scope, cost, or
time of the Contract.

1.31 Project means all activities necessary for realization of the Work. This includes design, contract award(s), execution of the Work itself, and fulfillment of all Contract and warranty obligations.

1.32 Progress Assessment Report (PAR) means the monthly compliance report to Owner verifying compliance with the HUB subcontracting plan (HSP).

1.33 Proposed Change Order (PCO) means a document that informs Contractor of a proposed change in the Work and appropriately describes or otherwise documents such change including Contractor’s response of pricing for the proposed change.

1.34 Punchlist means a list of minor items of Work to be completed or corrected by Contractor after Substantial Completion. Punchlists indicate minor items to be finished, remaining Work to be performed, or Work that does not meet quality or quantity requirements as required in the Contract Documents.

1.35 Record Documents mean the drawing set, Specifications, and other materials maintained produced by the A/E of Record Contractor that documents all addenda, Architect’s Supplemental Instructions, Change Orders, and postings and markings that record the as-constructed conditions of the Work and all changes made during construction. The Record Documents are produced using the As-Built Drawings and Specifications as provided by the Contractor, and any As-Built documents produced by the A/E of Record during the course of the construction.

1.36 Request for Information (RFI) means a written request by Contractor directed to A/E or ODR for a clarification of the information provided in the Contract Documents or for direction concerning information necessary to perform the Work that may be omitted from the Contract Documents.

1.37 Samples mean representative physical examples of materials, equipment, or workmanship used to confirm compliance with requirements and/or to establish standards for use in execution of the Work.

1.38 Schedule of Values means the detailed breakdown of the cost of the materials, labor, and equipment necessary to accomplish the Work as described in the Contract Documents, submitted by Contractor for approval by Owner and A/E.

1.39 Shop Drawings mean the drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data prepared by Contractor or its agents which detail a portion of the Work.

1.40 Site means the geographical area of the location of the Work.

1.41 Special Conditions mean the documents containing terms and conditions which may be unique to the Project. Special Conditions are a part of the Contract Documents and have precedence over the Uniform General Conditions and Supplementary General Conditions.
1.42 *Specifications* mean the written product of A/E that establishes the quality and/or performance of products utilized in the Work and processes to be used, including testing and verification for producing the Work.

1.43 *Subcontractor* means a business entity that enters into an agreement with Contractor to perform part of the Work or to provide services, materials, or equipment for use in the Work.

1.44 *Submittal Register* means a list provided by Contractor of all items to be furnished for review and approval by A/E and Owner and as identified in the Contract Documents including anticipated sequence and submittal dates.

1.45 *Substantial Completion* means the date determined and certified by Contractor, A/E, and Owner when the Work, or a designated portion thereof, is sufficiently complete, in accordance with the Contract, so as to be operational and fit for the use intended.

1.46 *Supplementary General Conditions* mean procedures and requirements that modify the Uniform General Conditions. Supplementary General Conditions, when used, have precedence over the Uniform General Conditions. *Texas Parks and Wildlife Department has adopted Uniform Supplementary General Conditions that apply to all TPWD construction projects. TPWD Uniform Supplementary General Conditions are indicated by the bold and italicized typeface shown here.*

1.47 *Unit Price Work* means the Work, or a portion of the Work, paid for based on incremental units of measurement.

1.48 *Unilateral Change Order (ULCO)* means a Change Order issued by Owner without the complete agreement of Contractor, as to cost and/or time.

1.49 *Work* means the administration, procurement, materials, equipment, construction and all services necessary for Contractor, and/or its agents, to fulfill Contractor's obligations under the Contract.

1.50 *Work Progress Schedule* means the continually updated time schedule prepared and monitored by Contractor that accurately indicates all necessary appropriate revisions as required by the conditions of the Work and the Project while maintaining a concise comparison to the Baseline Schedule.
Article 2. Wage Rates and Other Laws Governing Construction

2.1 Environmental Regulations. Contractor shall conduct activities in compliance with applicable laws and regulations and other requirements of the Contract relating to the environment and its protection at all times. Unless otherwise specifically determined, Owner is responsible for obtaining and maintaining permits related to stormwater runoff. Contractor shall conduct operations consistent with stormwater runoff permit conditions. Contractor is responsible for all items it brings to the Site, including hazardous materials, and all such items brought to the Site by its Subcontractors and suppliers, or by other entities subject to direction of Contractor. Contractor shall not incorporate hazardous materials into the Work without prior approval of Owner, and shall provide an affidavit attesting to such in association with request for Substantial Completion inspection.

2.2 Wage Rates. Contractor shall not pay less than the wage scale of the various classes of labor as shown on the prevailing wage schedule provided by Owner in the bid or proposal specifications. The specified wage rates are minimum rates only. Owner is not bound to pay any claims for additional compensation made by any Contractor because the Contractor pays wages in excess of the applicable minimum rate contained in the Contract. The prevailing wage schedule is not a representation that qualified labor adequate to perform the Work is available locally at the prevailing wage rates.

2.2.1 Notification to Workers. Contractor shall post the prevailing wage schedule in a place conspicuous to all workers on the Project Site When requested by Owner, Contractor shall furnish evidence of compliance with the Texas Prevailing Wage Law and the addresses of all workers.

2.2.1.1 Pursuant to Tex. Gov’t Code § 2258.024, Contractor shall keep, on site, true and accurate records showing the name and occupation of each worker employed by the Contractor or subcontractors and the actual per diem wages paid to each worker. The record shall be open to inspection by the ODR and their agents at all reasonable hours for the duration of the contract.

2.2.1.2 With each application for progress payment, Contractor shall make available upon request certified payroll records, including from subcontractors of any tier level, on Form WH-347 as promulgated by the U.S. Department of Labor, as may be revised from time to time and in unlocked and unprotected Excel format, along with copies of any and all Contract Documents between Contractor and any Subcontractors. Pursuant to Tex. Penal Code §§ 37.02 and 37.10, Employees of Contractor and subcontractors, including all tier levels, shall be subject to prosecution for submitting certified payroll records that contain materially false information.

2.2.1.3 The prevailing wage schedule is determined by Owner in compliance
with Tex. Gov't Code, Ch. 2258. Should Contractor at any time become aware that a particular skill or trade not reflected on Owner’s prevailing wage schedule will be or is being employed in the Work, whether by Contractor or by Subcontractor, Contractor shall promptly inform ODR of the proposed wage to be paid for the skill along with a justification for same and ODR shall promptly concur with or reject the proposed wage and classification.

2.2.1.4 Contractor is responsible for determining the most appropriate wage for a particular skill in relation to similar skills or trades identified on the prevailing wage schedule. In no case, shall any worker be paid less than the wage indicated for laborers.

2.2.1.5 Pursuant to Tex. Labor Code § 214.008, Misclassification of Workers; Penalty. The Owner requires Contractor and all subcontractors properly classify individuals as Employees or Independent Contractors.

2.2.2 **Penalty for Violation.** Contractor, and any Subcontractor, will pay to the State a penalty of sixty dollars ($60) for each worker employed for each day, or portion thereof, that the worker is paid less than the wage rates stipulated in the prevailing wage schedule.

2.2.3 **Complaints of Violations.**

2.2.3.1 **Owner’s Determination of Good Cause.** Upon receipt of information concerning a violation, Owner will conduct an investigation in accordance with Tex. Gov’t Code, Ch. 2258 and make an initial determination as to whether good cause exists that a violation occurred. Upon making a good cause finding, Owner will retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the prevailing wage schedule and any supplements thereto, together with the applicable penalties in accordance with Tex. Gov’t Code § 2258.023, such amounts being subtracted from successive progress payments pending a final decision on the violation.

2.2.3.2 **No Extension of Time.** If Owner’s determination proves valid that good cause existed to believe a violation had occurred, Contractor is not entitled to an extension of time for any delay arising directly or indirectly from the arbitration procedures.

2.2.3.3 **Cooperation with Owner’s Investigation.** Contractor shall cooperate with Owner during any investigations hereunder. Such cooperation shall include, but not necessarily be limited to, timely providing the information and/or documentation requested by Owner, which may include certified payroll records on Form WH-347 as promulgated by the U.S. Department of Labor, as may be revised from time to time and in unlocked and unprotected Excel format; and copies of any and
all Contract Documents between Contractor and any Subcontractors.

2.2.3.4 Notification to Owner. In the event Contractor or Subcontractor elect to appeal an initial determination made pursuant to Paragraph 2.2.3.1, the Contractor and/or Subcontractor, as applicable, shall deliver notice thereof to Owner.

2.3 Venue for Suits. The venue for any suit arising from the Contract will be in a court of competent jurisdiction in Travis County, Texas, or as may otherwise be designated in the Supplementary General Conditions.

2.4 Licensing of Trades. Contractor shall comply with all applicable provisions of State law related to license requirements for skilled tradesmen, contractors, suppliers and or laborers, as necessary to accomplish the Work. In the event Contractor, or one of its Subcontractors, loses its license during the term of performance of the Contract, Contractor shall promptly hire or contract with a licensed provider of the service at no additional cost to Owner.

2.5 Royalties, Patents, and Copyrights. Contractor shall pay all royalties and license fees, defend suits or claims for infringement of copyrights and patent rights, and shall hold Owner harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by Owner or A/E. However, if Contractor has reason to believe that the required design, process, or product is an infringement of a copyright or a patent, Contractor shall be responsible for such loss unless such information is promptly furnished to A/E.

2.6 State Sales and Use Taxes. Owner qualifies for exemption from certain State and local sales and use taxes pursuant to the provisions of Tex. Tax Code, Ch. 151. Upon request from Contractor, Owner shall furnish evidence of tax exempt status. Contractor may claim exemption from payment of certain applicable State taxes by complying with such procedures as prescribed by the State Comptroller of Public Accounts. Owner acknowledges not all items qualify for exemption. Owner is not obligated to reimburse Contractor for taxes paid on items that qualify for tax exemption.
Article 3. General Responsibilities of Owner and Contractor

3.1 Owner’s General Responsibilities. Owner is the entity identified as such in the Contract and referred to throughout the Contract Documents as if singular in number.

3.1.1 Preconstruction Conference. Prior to, or concurrent with, the issuance of Notice to Proceed with construction, a conference will be convened for attendance by Owner, Contractor, A/E and appropriate Subcontractors. The purpose of the conference is to establish a working understanding among the parties as to the Work, the operational conditions at the Project Site, and general administration of the Project. Topics include communications, schedules, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, maintaining required records and all other matters of importance to the administration of the Project and effective communications between the Project team members.

3.1.2 Owner’s Designated Representative. Prior to the start of construction, Owner will identify Owner’s Designated Representative (ODR), who has the express authority to act and bind Owner to the extent and for the purposes described in the various Articles of the Contract, including responsibilities for general administration of the Contract.

3.1.2.1 Unless otherwise specifically defined elsewhere in the Contract Documents, ODR is the single point of contact between Owner and Contractor. Notice to ODR, unless otherwise noted, constitutes notice to Owner under the Contract.

3.1.2.2 All directives on behalf of Owner will be conveyed to Contractor and A/E by ODR in writing.

3.1.2.3 Owner will furnish or cause to be furnished, free of charge, the number of complete sets of the Drawings, Specifications, and addenda as provided in the Supplementary General Conditions or Special Conditions.

3.1.2.4 The ODR will establish the protocol for planning, scheduling and documenting progress meetings with provisions for absence of various project team members that have a key role in these duties.

3.1.3 Owner Supplied Materials and Information.

3.1.3.1 Owner will furnish to Contractor those surveys describing the physical characteristics, legal description, limitations of the Site, Site utility locations, and other information used in the preparation of the Contract Documents.

3.1.3.2 Owner will provide information, equipment, or services under
Owner’s control to Contractor with reasonable promptness.

3.1.4 Availability of Lands. Owner will furnish, as indicated in the Contract, all required rights to use the lands upon which the Work occurs. This includes rights-of-way and easements for access and such other lands that are designated for use by Contractor. Contractor shall comply with all Owner identified encumbrances or restrictions specifically related to use of lands so furnished. Owner will obtain and pay for easements for permanent structures or permanent changes in existing facilities.

3.1.5 Limitation on Owner’s Duties.

3.1.5.1 Owner will not supervise, direct, control or have authority over or be responsible for Contractor’s means, methods, technologies, sequences or procedures of construction or the safety precautions and programs incident thereto. Owner is not responsible for any failure of Contractor to comply with laws and regulations applicable to the Work. Owner is not responsible for the failure of Contractor to perform or furnish the Work in accordance with the Contract Documents. Except as provided in Section 2.5, Owner is not responsible for the acts or omissions of Contractor, or any of its Subcontractors, suppliers or of any other person or organization performing or furnishing any of the Work on behalf of Contractor.

3.1.5.2 Owner will not take any action in contravention of a design decision made by A/E in preparation of the Contract Documents, when such actions are in conflict with statutes under which A/E is licensed for the protection of the public health and safety.

3.2 Role of Architect/Engineer. Unless specified otherwise in the Contract between Owner and Contractor, A/E shall provide general administration services for Owner during the construction phase of the project. Written correspondence, requests for information, and Shop Drawings/submittals shall be directed to A/E for action. A/E has the authority to act on behalf of Owner to the extent provided in the Contract Documents, unless otherwise modified by written instrument, which will be furnished to Contractor by ODR, upon request.

3.2.1 Site Visits.

3.2.1.1 A/E will make visits to the Site at intervals as provided in the A/E’s Contract with Owner, to observe the progress and the quality of the various aspects of Contractor’s executed Work and report findings to Owner.

3.2.1.2 A/E has the authority to interpret Contract Documents and inspect the Work for compliance and conformance with the Contract. Except as referenced in Paragraph 3.1.5.2, Owner retains the sole authority to accept or reject Work and issue direction for correction,
removal, or replacement of Work.

3.2.2 Clarifications and Interpretations. It may be determined that clarifications or interpretations of the Contract Documents are necessary. Upon direction by ODR, such clarifications or interpretations will be provided by A/E consistent with the intent of the Contract Documents. A/E will issue these clarifications with reasonable promptness to Contractor as A/E’s supplemental instruction (“ASI”) or similar instrument. If Contractor believes that such clarification or interpretation justifies an adjustment in the Contract Sum or the Contract Time, Contractor shall so notify Owner in accordance with the provisions of Article 11.

3.2.3 Limitations on Architect/Engineer Authority. A/E is not responsible for:

3.2.3.1 Contractor’s means, methods, techniques, sequences, procedures, safety, or programs incident to the Project, nor will A/E supervise, direct, control or have authority over the same;

3.2.3.2 The failure of Contractor to comply with laws and regulations applicable to the furnishing or performing the Work;

3.2.3.3 Contractor’s failure to perform or furnish the Work in accordance with the Contract Documents; or

3.2.3.4 Acts or omissions of Contractor, or of any other person or organization performing or furnishing any of the Work.

3.3 Contractor’s General Responsibilities. Contractor is solely responsible for implementing the Work in full compliance with all applicable laws and the Contract Documents and shall supervise and direct the Work using the best skill and attention to assure that each element of the Work conforms to the Contract requirements. Contractor is solely responsible for all construction means, methods, techniques, safety, sequences, coordination, procedures and protection of the installed work as part of the contract until substantial completion of the project. Contractor remains responsible for the care and protection of materials and Work in the areas where punch list items are completed until Final Completion.

3.3.1 Project Administration. Contractor shall provide Project administration for all Subcontractors, vendors, suppliers, and others involved in implementing the Work and shall coordinate administration efforts with those of A/E and ODR in accordance with these general conditions and other provisions of the Contract, and as outlined in the preconstruction conference. Contractor’s Project Administration includes periodic daily reporting on weather, work progress, labor, materials, equipment, obstructions to prosecution of the work, accidents and injuries in accordance with the Contract and transmitted no less frequently than on a weekly basis.

3.3.2 Contractor’s Management Personnel. Contractor shall employ a competent person or persons who will be present at the Project Site during the progress
of the Work to supervise or oversee the work. The competent persons are subject to the approval of ODR through the submittal process stated in Owner's Special Conditions. Contractor shall not change approved staff during the course of the project without the written approval of ODR unless the staff member leaves the employment of Contractor. Contractor shall provide additional quality control, safety and other staff as stated in the Supplementary General Conditions.

3.3.3 Labor. Contractor shall provide competent, suitably qualified personnel to survey, lay-out, and construct the Work as required by the Contract Documents and maintain good discipline and order at the Site at all times.

3.3.4 Services, Materials, and Equipment. Unless otherwise specified, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities, incidentals, and services necessary for the construction, performance, testing, start-up, inspection and completion of the Work.

3.3.5 Contractor General Responsibility. For Owner furnished equipment or material that will be in the care, custody, and control of Contractor, Contractor is responsible for damage or loss. Owner shall deliver to Contractor a complete list and respective values of such materials or equipment and make an equitable adjustment to the contract amount for any increase in cost of Builder’s Risk insurance.

3.3.6 Non-Compliant Work. Should A/E and/or ODR identify Work as non-compliant with the Contract Documents, A/E and/or ODR shall communicate the finding to Contractor, and Contractor shall correct such Work at no additional cost to the Owner. The approval of Work by either A/E or ODR does not relieve Contractor from the obligation to comply with all requirements of the Contract Documents.

3.3.7 Subcontractors. Contractor shall not employ any Subcontractor, supplier or other person or organization, whether initially or as a substitute, against whom Owner shall have reasonable objection. Owner will communicate such objections in writing within ten (10) days of receipt of Contractor’s intent to use such Subcontractor, supplier, or other person or organization. Contractor is not required to employ any Subcontractor, supplier or other person or organization to furnish any of the work to whom Contractor has reasonable objection. Contractor shall not substitute Subcontractors without the acceptance of Owner. Pursuant to Tex. Gov’t Code § 2269.256(b), if the Contractor reviews, evaluates and recommends that the Owner accept a bid or proposal from a Subcontractor but the Owner requires another bid or proposal to be accepted, Owner shall compensate the Contractor by a change in price, time or guaranteed maximum cost for any additional cost or risk the Contractor will incur because of Owner’s requirement to select another bid or proposal rather than the one recommended.
3.3.7.1 All Subcontracts and supply contracts shall be consistent with and bind the Subcontractors and suppliers to the terms and conditions of the Contract Documents including provisions of the Contract between Contractor and Owner.

3.3.7.2 Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor. Require all Subcontractors, suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with Owner only through Contractor. Contractor shall furnish to Owner a copy, at Owner's request, of each first-tier subcontract promptly after its execution. Contractor agrees that Owner has no obligation to review or approve the content of such contracts and that providing Owner such copies in no way relieves Contractor of any of the terms and conditions of the Contract, including, without limitation, any provisions of the Contract which require the Subcontractor to be bound to Contractor in the same manner in which Contractor is bound to Owner.

3.3.8 Continuing the Work. Contractor shall carry on the Work and adhere to the progress schedule during all disputes, disagreements, or alternative resolution processes with Owner. Contractor shall not delay or postpone any Work because of pending unresolved disputes, disagreements or alternative resolution processes, except as Owner and Contractor may agree in writing.

3.3.9 Cleaning. Contractor shall at all times, keep the Site and the Work clean and free from accumulation of waste materials or rubbish caused by the construction activities under the Contract. Contractor shall ensure that the entire Project is thoroughly cleaned prior to requesting Substantial Completion inspection and, again, upon completion of the Project prior to the final inspection.

3.3.10 Acts and Omissions of Contractor, its Subcontractors, and Employees. Contractor shall be responsible for acts and omissions of his employees and all its Subcontractors, their agents and employees. Owner may, in writing, require Contractor to remove from the Project any of Contractor's or its Subcontractor's employees whom ODR finds to be careless, incompetent, unsafe, uncooperative, disruptive, or otherwise objectionable.

3.3.11 Acts or Omissions. Contractor shall indemnify and hold harmless the State of Texas and Customers, AND/OR THEIR OFFICERS, AGENTS, EMPLOYEES, REPRESENTATIVES, CONTRACTORS, ASSIGNEES, AND/OR DESIGNEES FROM ANY AND ALL LIABILITY, ACTIONS, CLAIMS, DEMANDS, OR SUITS, AND ALL RELATED COSTS, ATTORNEY FEES, AND EXPENSES arising out of, or resulting from any acts or omissions of Contractor or its agents, employees, subcontractors, Order
Fulfillers, or suppliers of subcontractors in the execution or performance of the Contract and any Purchase Orders issued under the Contract. THE DEFENSE SHALL BE COORDINATED BY CONTRACTOR WITH THE OFFICE OF THE ATTORNEY GENERAL WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN ANY LAWSUIT AND CONTRACTOR MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM THE OFFICE OF THE ATTORNEY GENERAL. CONTRACTOR AND OWNER AGREE TO FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM.

3.3.12 Infringements.

3.3.12.1 Contractor shall indemnify and hold harmless the State of Texas and Customers, AND/OR THEIR EMPLOYEES, AGENTS, REPRESENTATIVES, CONTRACTORS, ASSIGNEES, AND/OR DESIGNEES from any and all third party claims involving infringement of United States patents, copyrights, trade and service marks, and any other intellectual or intangible property rights in connection with the PERFORMANCES OR ACTIONS OF CONTRACTOR PURSUANT TO THIS CONTRACT. CONTRACTOR AND THE CUSTOMER AGREE TO FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM. CONTRACTOR SHALL BE LIABLE TO PAY ALL COSTS OF DEFENSE INCLUDING ATTORNEYS’ FEES. THE DEFENSE SHALL BE COORDINATED BY CONTRACTOR WITH THE OFFICE OF THE ATTORNEY GENERAL WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN ANY LAWSUIT AND CONTRACTOR MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM THE OFFICE OF THE ATTORNEY GENERAL.

3.3.12.2 Contractor shall have no liability under this section if the alleged infringement is caused in whole or in part by: (i) use of the product or service for a purpose or in a manner for which the product or service was not designed, (ii) any modification made to the product without Contractor’s written approval, (iii) any modifications made to the product by Contractor pursuant to Customer’s specific instructions, (iv) any intellectual property right owned by or licensed to Customer, or (v) any use of the product or service by Customer that is not in conformity with the terms of any applicable license agreement.

3.3.12.3 If Contractor becomes aware of an actual or potential claim, or Customer provides Contractor with notice of an actual or potential claim, Contractor may (or in the case of an injunction against Customer, shall), at Contractor’s sole option and expense; (i) procure for the Customer the right to continue to use the affected portion of the product or service, or (ii) modify or replace the affected portion of the product or service with functionally equivalent or superior product
or service so that Customer's use is non-infringing.

3.3.12.4 Taxes/Workers' Compensation/Unemployment Insurance—Including Indemnity.

3.3.12.4.1 CONTRACTOR AGREES AND ACKNOWLEDGES THAT DURING THE EXISTENCE OF THIS CONTRACT, CONTRACTOR SHALL BE ENTIRELY RESPONSIBLE FOR THE LIABILITY AND PAYMENT OF CONTRACTOR'S AND CONTRACTOR'S EMPLOYEES' TAXES OF WHATEVER KIND, ARISING OUT OF THE PERFORMANCES IN THIS CONTRACT. CONTRACTOR AGREES TO COMPLY WITH ALL STATE AND FEDERAL LAWS APPLICABLE TO ANY SUCH PERSONS, INCLUDING LAWS REGARDING WAGES, TAXES, INSURANCE, AND WORKERS' COMPENSATION. THE CUSTOMER AND/OR THE STATE SHALL NOT BE LIABLE TO CONTRACTOR, ITS EMPLOYEES, AGENTS, OR OTHERS FOR THE PAYMENT OF TAXES OR THE PROVISION OF UNEMPLOYMENT INSURANCE AND/OR WORKERS' COMPENSATION OR ANY BENEFIT AVAILABLE TO A STATE EMPLOYEE OR EMPLOYEE OF ANOTHER GOVERNMENTAL ENTITY CUSTOMER.

3.3.12.4.1 CONTRACTOR AGREES TO INDEMNIFY AND HOLD HARMLESS OWNER, THE STATE OF TEXAS AND/OR THEIR EMPLOYEES, AGENTS, REPRESENTATIVES, CONTRACTORS, AND/OR ASSIGNEES FROM ANY AND ALL LIABILITY, ACTIONS, CLAIMS, DEMANDS, OR SUITS, AND ALL RELATED COSTS, ATTORNEYS' FEES, AND EXPENSES, RELATING TO TAX LIABILITY, UNEMPLOYMENT INSURANCE AND/OR WORKERS' COMPENSATION IN ITS PERFORMANCE UNDER THIS CONTRACT. CONTRACTOR SHALL BE LIABLE TO PAY ALL COSTS OF DEFENSE INCLUDING ATTORNEYS' FEES. THE DEFENSE SHALL BE COORDINATED BY CONTRACTOR WITH THE OFFICE OF THE ATTORNEY GENERAL WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN ANY LAWSUIT
AND VENDOR MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM THE OFFICE OF THE ATTORNEY GENERAL. CONTRACTOR AND OWNER AGREE TO FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM.

3.3.12.5 The provisions of this indemnification are solely for the benefit of the parties hereto and not intended to create or grant any rights, contractual or otherwise, to any other person or entity.

3.3.12.6 Contractor shall promptly advise Owner in writing of any claim or demand against Owner or against Contractor which involves Owner and known to Contractor and related to or arising out of Contractor’s activities under this Contract.

3.3.13 Ancillary Areas. Operate and maintain operations and associated storage areas at the site of the Work in accordance with the following:

3.3.13.1 Confine all Contractor operations, including storage of materials and employee parking upon the Site of Work, to areas designated by Owner.

3.3.13.2 Contractor may erect, at its own expense, temporary buildings that will remain its property. Remove such buildings and associated utility service lines upon completion of the Work, unless Contractor requests and Owner provides written consent that it may abandon such buildings and utilities in place.

3.3.13.3 Use only established roadways or construct and use such temporary roadways as may be authorized by Owner. Do not allow load limits of vehicles to exceed the limits prescribed by appropriate regulations or law. Provide protection to road surfaces, curbs, sidewalks, trees, shrubbery, sprinkler systems, drainage structures and other like existing improvements to prevent damage and repair any damage thereto at the expense of Contractor.

3.3.13.4 Owner may restrict Contractor’s entry to the Site to specifically assigned entrances and routes.

3.3.14 Separate Contracts. Owner reserves the right to award other contracts in connection with other portions of the Project under these same or substantially similar contract conditions, including those portions related to insurance and waiver of subrogation. Owner reserves the right to perform operations related to the Project with Owner’s own forces.

3.3.15 Under a system of separate contracts, the conditions described herein continue to apply except as may be amended by change order.
3.3.16 Contractor shall cooperate with other contractors or forces employed on the Project by Owner, including providing access to Site and Project information as requested.

3.3.17 Owner shall be reimbursed by Contractor for costs incurred by Owner which are payable to a separate contractor because of delays, improperly timed activities, or defective construction by Contractor. Owner will equitably adjust the Contract by Change Order for costs incurred by Contractor because of delays, improperly timed activities, damage to the Work or defective construction by a separate contractor.
Article 4. Historically Underutilized Business (HUB) Subcontracting Plan

4.1 General Description. The purpose of the Historically Underutilized Business (HUB) program is to promote equal business opportunities for economically disadvantaged persons (as defined by Tex. Gov't Code, Ch. 2161) to contract with the State of Texas in accordance with the goals specified in the State of Texas Disparity Study. The HUB program annual procurement utilization goals are defined in 34 T.A.C. § 20.13(b).

4.1.1 State agencies are required by statute to make a good faith effort to assist HUBs in participating in contract awards issued by the State. 34 T.A.C. § 20.13(b) outlines the State’s policy to encourage the utilization of HUBs in State contracting opportunities through race, ethnic and gender neutral means.

4.1.2 A Contractor who contracts with the State in an amount of $100,000 or greater is required to make a good faith effort to award subcontracts to HUBs in accordance with 34 T.A.C. § 20.14(a)(2)(A) by submitting a HUB subcontracting plan within twenty-four (24) hours after the bid or response is due and complying with the HUB subcontracting plan after it is accepted by Owner and during the term of the Contract. Unless stated otherwise in the contract documents, the HUB subcontracting plan shall be submitted with the bid or response on or before the specified due date and time for the bid or response.

4.2 Compliance with Approved HUB Subcontracting Plan. Contractor, having been awarded this Contract in part by complying with the HUB program statute and rules, hereby covenants to continue to comply with the HUB program as follows:

4.2.1 Prior to adding or substituting a Subcontractor, promptly notify Owner in the event a change is required for any reason to the accepted HUB subcontracting plan.

4.2.2 Conduct the good-faith effort activities required and provide Owner with necessary documentation to justify approval of a change to the approved HUB subcontracting plan.

4.2.3 Cooperate in the execution of a Change Order or such other approval of the change in the HUB subcontracting plans as Contractor and Owner may agree to.

4.2.4 Maintain and make available to Owner upon request business records documenting compliance with the accepted HUB subcontracting plan.

4.2.5 Upon receipt of payment for performance of Work, submit to Owner a compliance report, in the format required by Owner that demonstrates Contractor’s performance of the HUB subcontracting plan. TPWD requires submission of a copy of the compliance report with the Application for Payment for work performed.
4.2.5.1 Progress Assessment Report (PAR): monthly compliance reports to Owner (contracting agency), verifying their compliance with the HUB subcontracting plan, including the use/expenditures they have made to Subcontractors. The PAR is available at in the Index Forms Library on the Facilities Design & Construction page of the Texas Facilities Commission website (http://www.window.state.tx.us/procurement/prog/hub/hub-forms/progressassessmenttrpt.xls). Contractor shall submit a PAR to TPWD HUB Administration no later than the 5th day of the month. Contractor shall submit a copy of the current month’s PAR with the Application for Payment.

4.2.6 Promptly and accurately explain and provide supplemental information to Owner to assist in Owner’s investigation of Contractor’s good-faith effort to fulfill the HUB subcontracting plan and the requirements under 34 T.A.C. § 20.14(a)(1).

4.3 Failure to Demonstrate Good-Faith Effort. Upon a determination by Owner that Contractor has failed to demonstrate a good-faith effort to fulfill the HUB subcontracting plan or any Contract covenant detailed above, Owner may, in addition to all other remedies available to it, report the failure to perform to the Comptroller of Public Accounts, Texas Procurement and Support Services Division, Historically Underutilized Business Program and may bar Contractor from future contracting opportunities with Owner.
Article 5. Bonds and Insurance

5.1 Construction Bonds. Contractor is required to tender to Owner, prior to commencing the Work, performance and payment bonds, as required by Tex. Gov’t Code, Ch. 2253. On Construction Manager-at-Risk and Design-Build Projects the Owner shall require a security bond, as described in Subsection 5.1.2 below.

5.1.1 Bond Requirements. Each bond shall be executed by a corporate surety or sureties authorized to do business in the State of Texas and acceptable to Owner, on Owner’s form, and in compliance with the relevant provisions of the Texas Insurance Code. If any bond is for more than ten (10) percent of the surety’s capital and surplus, Owner may require certification that the company has reinsured the excess portion with one or more reinsurers authorized to do business in the State. A reinsurer may not reinsure for more than ten (10) percent of its capital and surplus. If a surety upon a bond loses its authority to do business in the State, Contractor shall, within thirty (30) days after such loss, furnish a replacement bond at no added cost to Owner.

5.1.1.1 A Performance bond is required if the Contract Sum is in excess of $100,000. The performance bond is solely for the protection of Owner. The performance bond is to be for the Contract Sum to guarantee the faithful performance of the Work in accordance with the Contract Documents. The form of the bond shall be approved by the Office of the Attorney General of Texas. The performance bond shall be effective through Contractor’s warranty period.

5.1.1.2 A Payment bond is required if the Contract price is in excess of $25,000. The payment bond is to be for the Contract Sum and is payable to Owner solely for the protection and use of payment bond beneficiaries. The form of the bond shall be approved by the Office of the Attorney General of Texas.

5.1.2 Security Bond. The security bond provides protection to Owner if Contractor presents an acceptable guaranteed maximum price (“GMP”) to Owner and 1) fails to execute the GMP; or 2) fails to deliver the required payment and performance bonds within the time period stated below.

5.1.3 When Bonds Are Due.

5.1.3.1 Security bonds are due within ten (10) days of signing a Construction Manager-at-Risk or Design-Build Contract, unless stated otherwise in the contract documents.

5.1.3.2 Payment and performance bonds are due within ten (10) days of Contractor’s receipt of a fully executed GMP on a Construction Manager-at-Risk project or the Contract Sum for a Design-Build project, or within ten (10) days of Contractor’s receipt of a fully executed Contract on competitively bid or competitive sealed
5.1.4 **Power of Attorney.** Each bond shall be accompanied by a valid power of attorney (issued by the surety company and attached, signed and sealed with the corporate embossed seal, to the bond) authorizing the attorney-in-fact who signs the bond to commit the company to the terms of the bond, and stating any limit in the amount for which the attorney can issue a single bond.

5.1.5 **Bond Indemnification.** The process of requiring and accepting bonds and making claims there under shall be conducted in compliance with Tex. Gov’t Code, Ch. 2253. IF FOR ANY REASON A STATUTORY PAYMENT OR PERFORMANCE BOND IS NOT HONORED BY THE SURETY, CONTRACTOR SHALL FULLY INDEMNIFY AND HOLD OWNER HARMLESS OF AND FROM ANY COSTS, LOSSES, OBLIGATIONS OR LIABILITIES IT INCURS AS A RESULT.

5.1.6 **Furnishing Bond Information.** Owner shall furnish certified copies of the payment bond and the related Contract to any qualified person seeking copies who complies with Tex. Gov’t Code § 2253.026.

5.1.7 **Claims on Payment Bonds.** Claims on payment bonds must be sent directly to Contractor and his surety in accordance with Tex. Gov’t Code § 2253.041. All payment bond claimants are cautioned that no lien exists on the funds unpaid to Contractor on such Contract, and that reliance on notices sent to Owner may result in loss of their rights against Contractor and/or his surety. Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any representation by any agent or employee.

5.1.8 **Payment Claims when Payment Bond not Required.** The rights of Subcontractors regarding payment are governed by Tex. Prop. Code §§ 53.231 – 53.239 when the value of the Contract between Owner and Contractor is less than $25,000.00. These provisions set out the requirements for filing a valid lien on funds unpaid to Contractor as of the time of filing the claim, actions necessary to release the lien and satisfaction of such claim.

5.1.9 **Sureties.** A surety shall be listed on the US Department of the Treasury’s Listing of Approved Sureties maintained by the Bureau of Financial Management Service (FMS), www.fins.treas.gov/c570, stating companies holding Certificates of Authority as acceptable sureties on Federal bonds and acceptable reinsuring companies (FMS Circular 570).

5.2 **Insurance Requirements.** Contractor shall carry insurance in the types and amounts indicated in this Article for the duration of the Contract. The insurance shall be evidenced by delivery to Owner of certificates of insurance executed by the insurer or its authorized agent stating coverages, limits, expiration dates and compliance with all applicable required provisions. Upon request, Owner, and/or its agents, shall be entitled to receive without expense, copies of the policies and all endorsements. Contractor shall update all expired policies prior to submission for monthly payment.
Failure to update policies shall be reason for withholding of payment until renewal is provided to Owner.

5.2.1 Contractor shall provide and maintain all insurance coverage with the minimum amounts described below until the end of the warranty period unless otherwise stated in Supplementary General Conditions or Special Conditions. Failure to maintain insurance coverage, as required, is grounds for suspension of Work for cause pursuant to Article 14.

5.2.2 Contractor shall deliver to Owner true and complete copies of certificates and corresponding policy endorsements prior to the issuance of any Notice to Proceed.

5.2.3 Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

5.2.4 The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.2.5 The insurance coverage and limits established herein shall not be interpreted as any representation or warranty that the insurance coverage and limits necessarily will be adequate to protect Contractor.

5.2.6 Coverage shall be written on an occurrence basis by companies authorized and admitted to do business in the State of Texas and rated A or better by A.M. Best Company or similar rating company or otherwise acceptable to Owner.

5.2.2.1 Insurance Coverage Required.

5.2.2.1.1 Workers' Compensation. Insurance with limits as required by the Texas Workers' Compensation Act, with the policy endorsed to provide a waiver of subrogation in favor of Owner, employer's liability insurance of not less than:

$1,000,000 each accident;

$1,000,000 disease each employee; and

$1,000,000 disease policy limit.

5.2.2.1.2 Commercial General Liability Insurance. Including premises, operations, independent contractor's liability, products and completed operations and contractual liability, covering, but not limited to, the liability assumed under the indemnification provisions of this Contract, fully insuring Contractor's liability for bodily injury
(including death) and property damage with a minimum limit of:

$1,000,000 per occurrence;

$2,000,000 general aggregate;

$5,000 Medical Expense each person;

$1,000,000 Personal Injury and Advertising Liability;

$2,000,000 products and completed operations aggregate;

$50,000 Damage to Premises Rented to You; and

Coverage shall be on an “occurrence” basis.

The policy shall include coverage extended to apply to completed operations and explosion, collapse, and underground hazards. The policy shall include endorsement CG2503 Amendment of Aggregate Limits of Insurance (per Project) or its equivalent.

If the Work involves any activities within fifty (50) feet of any railroad, railroad protective insurance as may be required by the affected railroad, written for not less than the limits required by such railroad.

5.2.2.1.3 Asbestos Abatement Liability Insurance, including coverage for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos containing materials. *This requirement applies if the Work or the Project includes asbestos containing materials.

The combined single limit for bodily injury and property damage will be a minimum of $1,000,000 per occurrence.

*Specific requirement for claims-made form: Required period of coverage will be determined by the following formula: continuous coverage for life of the Contract, plus one (1) year (to provide coverage for the warranty period), and an extended discovery period for a minimum of five (5) years which shall begin at the end of the warranty period.

Employer’s liability limits for asbestos abatement will be:
$500,000 each accident;

$500,000 disease each employee; and

$500,000 disease policy limit.

If this Contract is for asbestos abatement only, the Special Form builder's risk or Special Form installation floater (e) is not required.

5.2.2.1.4 Comprehensive Automobile Liability Insurance, covering owned, hired, and non-owned vehicles, with a minimum combined single limit for bodily injury (including death) and property damage of $1,000,000 per accident. No aggregate shall be permitted for this type of coverage.

Such insurance is to include coverage for loading and unloading hazards.

5.2.2.1.5 Special Form Builder's Risk Insurance, if applicable (or Special Form installation floater for instances in which the project involves solely the installation of material and/or equipment). Coverage shall be Special Form, including, but not limited to, fire, extended coverage, vandalism and malicious mischief, theft and, if applicable, flood, earth movement and named storm. Builder's risk and installation floater limits shall be equal to 100 percent of the Contract Sum plus, if any, existing property and Owner-furnished equipment specified by Owner. The policy shall be written jointly in the names of Owner and Contractor. Subcontractors shall be named as additional insureds. The policy shall have endorsements as follows:

5.2.2.1.5.1 This insurance shall be specific as to coverage and not contributing insurance with any permanent insurance maintained on the property.

5.2.2.1.5.2 This insurance shall not contain an occupancy clause suspending or reducing coverage should Owner partially occupy the Site and before the parties have determined Substantial Completion.

5.2.2.1.5.3 Loss, if any, shall be adjusted with and made payable to Owner as trustee for the insureds as their interests may appear. Owner shall be named as loss payee.
5.2.2.1.5.4 For renovation projects or projects that involve portions of Work contained within an existing structure, refer to Supplementary General and Special Conditions for possible additional builder’s risk insurance requirements.

5.2.2.1.5.5 For Owner furnished equipment or materials that will be in care, custody or control of Contractor, Contractor will be responsible for damage and loss.

5.2.2.1.5.6 For those properties located within a Tier 1 or 2 windstorm area, named storm coverage must be provided with limits specified by Owner.

5.2.2.1.5.7 For those properties located in flood prone areas, flood insurance coverage must be provided with limits specified by Owner.

5.2.2.1.5.8 Builder’s risk insurance policy shall remain in effect until Substantial Completion.

5.2.2.1.6 “Umbrella” Liability Insurance. Contractor shall obtain, pay for and maintain umbrella liability insurance during the Contract term, insuring Contractor for an amount of not less than amount specified in the Supplementary General Conditions or Special Conditions that provides coverage at least as broad as and applies in excess and follows form of the primary liability coverages required hereinabove. The policy shall provide “drop down” coverage where underlying primary insurance coverage limits are insufficient or exhausted.

5.2.3 Policies must include the following clauses, as applicable:

5.2.3.1 This insurance shall not be canceled, materially changed, or non-renewed except after thirty (30) days written notice has been given to Owner.

5.2.3.2 It is agreed that Contractor’s insurance shall be deemed primary with respect to any insurance or self insurance carried by Owner for liability arising out of operations under the Contract with Owner.

5.2.3.3 Owner, its officials, directors, employees, representatives, and volunteers are added as additional insureds as respects operations and activities of, or on behalf of the named insured performed under Contract with Owner. The additional insured status must cover
completed operations as well. This is not applicable to workers' compensation policies.

5.2.3.4 A waiver of subrogation in favor of Owner shall be provided in all policies.

5.2.4 Without limiting any of the other obligations or liabilities of Contractor, Contractor shall require each Subcontractor performing work under the Contract, at Subcontractor's own expense, to maintain during the term of the Contract, the same stipulated minimum insurance including the required provisions and additional policy conditions as shown above. As an alternative, Contractor may include its Subcontractors as additional insureds on its own coverage as prescribed under these requirements. Contractor's certificate of insurance shall note in such event that Subcontractors are included as additional insureds and that Contractor agrees to provide workers' compensation for Subcontractors and their employees. Contractor shall obtain and monitor the certificates of insurance from each Subcontractor in order to assure compliance with the insurance requirements. Contractor must retain the certificates of insurance for the duration of the Contract plus five (5) years and shall have the responsibility of enforcing these insurance requirements among its Subcontractors. Owner shall be entitled, upon request and without expense, to receive copies of these certificates.

5.2.5 Workers' compensation insurance coverage must be provided for all workers at all tier levels and meet the statutory requirements of Tex. Lab. Code § 401.011(44) and specific to construction projects for public entities as required by Tex. Lab. Code § 406.096.
Article 6. Construction Documents, Coordination Documents, and Record Documents

6.1 Drawings and Specifications.

6.1.1 Copies Furnished. Contractor will be furnished, free of charge, the number of complete sets of the Drawings, Specifications, and Addenda as provided in the Supplementary General Conditions or Special Conditions. Additional complete sets of Drawings and Specifications, if requested, will be furnished at reproduction cost to the entity requesting such additional sets. Electronic copies of such documents will be provided to Contractor without charge. **Unless otherwise called for in the Special Conditions, four (4) sets of drawings and specifications will be furnished to the Contractor free of charge upon justification of need.**

6.1.2 Ownership of Drawings and Specifications. All Drawings, Specifications and copies thereof furnished by A/E are to remain A/E’s property **unless the Owner and A/E agree otherwise.** These documents are not to be used on any other project, and with the exception of the Contract record set and electronic versions needed for warranty operations, are to be returned to the A/E, upon request, following completion of the Work.

6.1.3 Interrelation of Documents. The Contract Documents as referenced in the Contract between Owner and Contractor are complimentary, and what is required by one shall be as binding as if required by all.

6.1.4 Resolution of Conflicts in Documents. Where conflicts may exist within the Contract Documents, the documents shall govern in the following order: (a) Change Orders, addenda, and written amendments to the Contract; (b) the Contract; (c) Drawings; (d) Specifications (but Specifications shall control over Drawings as to quality of materials and workmanship); and (e) other Contract Documents. Among categories of documents having the same order of precedence, the term or provision that includes the latest date shall control and more specific requirements shall govern over general requirements. Contractor shall notify A/E and ODR for resolution of the issue prior to executing the Work in question.

6.1.5 Contractor's Duty to Review Contract Documents. In order to facilitate its responsibilities for completion of the Work in accordance with and as reasonably inferable from the Contract Documents, prior to commencing the Work, Contractor shall examine and compare the Contract Documents, information furnished by Owner, relevant field measurements made by Contractor and any visible or reasonably anticipated conditions at the Site affecting the Work. This duty extends throughout the construction phase prior to commencing each particular work activity and/or system installation.
6.1.6 Discrepancies and Omissions in Drawings and Specifications.

6.1.6.1 Promptly report to ODR and to A/E the discovery of any apparent error, omission or inconsistency in the Contract Documents prior to execution of the Work. *The Owner does not warrant or make any representations as to the accuracy or completeness of the information furnished to the Contractor by the Owner.*

6.1.6.2 It is recognized that Contractor is not acting in the capacity of a licensed design professional, unless it is performing as a Design-Build firm.

6.1.6.3 It is further recognized that Contractor’s examination of Contract Documents is to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies or to ascertain compliance with applicable laws, building codes or regulations, unless it is performing as a Design-Build firm or a Construction Manager-at-Risk.

6.1.6.4 When performing as a Design-Build firm, Contractor has sole responsibility for discrepancies, errors, and omissions in the Drawings and Specifications.

6.1.6.5 When performing as a Construction Manager-at-Risk, Contractor has a shared responsibility with A/E for discovery and resolution of discrepancies, errors, and omissions in the Contract Documents. In such case, Contractor’s responsibility pertains to review, coordination, and recommendation of resolution strategies within budget constraints.

6.1.6.6 Contractor has no liability for errors, omissions, or inconsistencies unless Contractor knowingly failed to report a recognized problem to Owner or the Work is executed under a Design-Build or Construction Manager-at-Risk Contract as outlined above. Should Contractor fail to perform the examination and reporting obligations of these provisions, Contractor is responsible for avoidable costs and direct and/or consequential damages.

6.2 Requirements for Record Documents. Contractor shall:

6.2.1 Maintain at the Site one copy of all Drawings, Specifications, addenda, approved submittals, Contract modifications, and all Project correspondence. Keep current and maintain Drawings and Specifications in good order with postings and markings to record actual conditions of Work and show and reference all changes made during construction. Provide Owner and A/E access to these documents.
6.2.2 Maintain the Record Documents As-Builts including Drawings, Specifications and other materials which reflect the actual field conditions and representations of the Work performed, whether it be directed by addendum, Change Order or otherwise. Make available all records prescribed herein for reference and examination by Owner and its representatives and agents.

6.2.3 Update the Record Documents As-Builts at least monthly prior to submission of periodic partial pay estimates. Failure to maintain current Record Documents constitutes cause for denial of a progress payment otherwise due.

6.2.4 Prior to requesting Substantial Completion inspection Contractor shall furnish a copy of its marked-up Record Documents As-Builts and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties and like publications, or parts for all installed equipment, systems, and like items and as described in the Contract Documents. (Unexecuted samples of the aforementioned documentation may be reviewed by ODR when the absence of substantial completion transactions preclude execution; however, Contractor remains obligated to provide fully executed copies of such materials prior to final payment.)

6.2.5 Once determined acceptable by ODR with input from A/E, provide one (1) reproducible copy and one (1) electronic media copy of all Record Documents As-Built documents unless otherwise required by the Supplementary General Conditions or Special Conditions.

6.2.6 Contractor shall be responsible for updating the Record As-Built Documents for all Contractor initiated documents and changes to the Contract Documents due to coordination and actual field conditions, including RFIs.

6.2.7 A/E shall be responsible for updating the Record As-Built Documents for with any addenda, Change Orders, A/E supplemental instructions and any other alterations to the Contract Documents generated by A/E or Owner. A/E shall be responsible for compiling all As-Built documentation (as produced both by the Contractor and by the A/E) into the Record Documents.
Article 7. Construction Safety

7.1 General. It is the duty and responsibility of Contractor and all of its Subcontractors to be familiar with, enforce and comply with all requirements of Public Law No. 91-596, 29 U.S.C. § 651 et. seq., the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto. Contractor shall prepare a safety plan specific to the Project and submit it to ODR and A/E prior to commencing Work. In addition, Contractor and all of its Subcontractors shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property to protect them from damage, injury or loss and erect and maintain all necessary safeguards for such safety and protection.

7.2 Notices. Contractor shall provide notices as follows:

7.2.1 Notify owners of adjacent property including those that own or operate utility services and/or underground facilities, and utility owners, when prosecution of the Work may affect them or their facilities, and cooperate with them in the protection, removal, relocation and replacement, and access to their facilities and/or utilities.

7.2.2 Coordinate the exchange of material safety data sheets (MSDSs) or other hazard communication information required to be made available to or exchanged between or among employers at the site in connection with laws and regulations. Maintain a complete file of MSDSs for all materials in use on site throughout the construction phase and make such file available to Owner and its agents as requested.

7.3 Emergencies. In any emergency affecting the safety of persons or property, Contractor shall act to minimize, mitigate, and prevent threatened damage, injury or loss.

7.3.1 Have authorized agents of Contractor respond immediately upon call at any time of day or night when circumstances warrant the presence of Contractor to protect the Work or adjacent property from damage or to take such action pertaining to the Work as may be necessary to provide for the safety of the public.

7.3.2 Give ODR and A/E prompt notice of all such events.

7.3.3 If Contractor believes that any changes in the Work or variations from Contract Documents have been caused by its emergency response, promptly notify Owner within seventy-two (72) hours of the emergency response event.

7.3.4 Should Contractor fail to respond, Owner is authorized to direct other forces to take action as necessary and Owner may deduct any cost of remedial action from funds otherwise due Contractor.
7.4 **Injuries.** In the event of an incident or accident involving outside medical care for an individual on or near the Work, Contractor shall notify ODR and other parties as may be directed promptly, but no later than twenty-four (24) hours after Contractor learns that an event required medical care.

7.4.1 Record the location of the event and the circumstances surrounding it, by using photography or other means, and gather witness statements and other documentation which describes the event.

7.4.2 Supply ODR and A/E with an incident report no later than thirty-six (36) hours after the occurrence of the event. In the event of a catastrophic incident (one (1) fatality or three (3) workers hospitalized), barricade and leave intact the scene of the incident until all investigations are complete. A full set of incident investigation documents, including facts, finding of cause, and remedial plans shall be provided within one (1) week after occurrence, unless otherwise directed by legal counsel. Contractor shall provide ODR with written notification within one week of such catastrophic event if legal counsel delays submission of full report.

7.5 **Environmental Safety.** Upon encountering any previously unknown potentially hazardous material, or other materials potentially contaminated by hazardous material, Contractor shall immediately stop work activities impacted by the discovery, secure the affected area, and notify ODR immediately.

7.5.1 Bind all Subcontractors to the same duty.

7.5.2 Upon receiving such notice, ODR will promptly engage qualified experts to make such investigations and conduct such tests as may be reasonably necessary to determine the existence or extent of any environmental hazard. Upon completion of this investigation, ODR will issue a written report to Contractor identifying the material(s) found and indicate any necessary steps to be taken to treat, handle, transport or dispose of the material.

7.5.3 Owner may hire third-party Contractors to perform any or all such steps.

7.5.4 Should compliance with ODR’s instructions result in an increase in Contractor’s cost of performance, or delay the Work, Owner will make an equitable adjustment to the Contract Sum and/or the time of completion, and modify the Contract in writing accordingly.

7.6 **Trenching Plan.** When the project requires excavation which either exceeds a depth of four (4) feet, or results in any worker’s upper body being positioned below grade level, Contractor is required to submit a trenching plan to ODR prior to commencing trenching operations unless an engineered plan is part of the Contract Documents. The plan is required to be prepared and sealed by a professional engineer registered in the State of Texas, and hired or employed by Contractor or Subcontractor to perform the work. Said engineer cannot be anyone who is otherwise either directly or indirectly engaged on this project.
Article 8. Quality Control

8.1 Materials & Workmanship. Contractor shall execute Work in a good and workmanlike manner in accordance with the Contract Documents. Contractor shall develop and provide a quality control plan specific to this Project and acceptable to Owner. Where Contract Documents do not specify quality standards, complete and construct all Work in compliance with generally accepted construction industry standards. Unless otherwise specified, incorporate all new materials and equipment into the Work under the Contract.

8.2 Testing.

8.2.1 Owner is responsible for coordinating and paying for routine and special tests required to confirm compliance with quality and performance requirements, except as stated below or otherwise required by the Contract Documents. Contractor shall provide the following testing:

8.2.1.1 Any test of basic material or fabricated equipment included as part of a submittal for a required item in order to establish compliance with the Contract Documents.

8.2.1.2 Any test of basic material or fabricated equipment offered as a substitute for a specified item on which a test may be required in order to establish compliance with the Contract Documents.

8.2.1.3 Preliminary, start-up, pre-functional and operational testing of building equipment and systems as necessary to confirm operational compliance with requirements of the Contract Documents.

8.2.1.4 All subsequent tests on original or replaced materials conducted as a result of prior testing failure.

8.2.2 All testing shall be performed in accordance with standard test procedures by an accredited laboratory, or special consultant as appropriate, acceptable to Owner. Results of all tests shall be provided promptly to ODR, A/E, and Contractor.

8.2.3 Non-Compliance (Test Results). Should any of the tests indicate that a material and/or system does not comply with the Contract requirements, the burden of proof remains with Contractor, subject to:

8.2.3.1 Contractor selection and submission of the laboratory for Owner acceptance.

8.2.3.2 Acceptance by Owner of the quality and nature of tests.

8.2.3.3 All tests taken in the presence of A/E and/or ODR, or their representatives.
8.2.3.4 If tests confirm that the material/systems comply with Contract Documents, Owner will pay the cost of the test.

8.2.3.5 If tests reveal noncompliance, Contractor will pay those laboratory fees and costs of that particular test and all future tests, of that failing Work, necessary to eventually confirm compliance with Contract Documents.

8.2.3.6 Proof of noncompliance with the Contract Documents will make Contractor liable for any corrective action which ODR determines appropriate, including complete removal and replacement of non-compliant work or material.

8.2.4 Notice of Testing. Contractor shall give ODR and A/E timely notice of its readiness and the date arranged so ODR and A/E may observe such inspection, testing, or approval. **Contractor shall give Owner a minimum of five (5) working days advance notice prior to testing.**

8.2.5 Test Samples. Contractor is responsible for providing Samples of sufficient size for test purposes and for coordinating such tests with their Work Progress Schedule to avoid delay.

8.2.6 Covering Up Work. If Contractor covers up any Work without providing Owner an opportunity to inspect, Contractor shall, if requested by ODR, uncover and recover the work at Contractor’s expense.

8.3 Submittals.

8.3.1 Contractor’s Submittals. Contractor shall submit with reasonable promptness consistent with the Project schedule and in orderly sequence all Shop Drawings, Samples, or other information required by the Contract Documents, or subsequently required by Change Order. Prior to submitting, Contractor shall review each submittal for general compliance with Contract Documents and approve submittals for review by A/E and Owner by an approval stamp affixed to each copy. Submittal data presented without Contractor’s stamp will be returned without review or comment, and any delay resulting from failure is Contractor’s responsibility.

8.3.1.1 Contractor shall within twenty-one (21) days of the effective date of the Notice To Proceed with construction, submit to ODR and A/E, a submittal schedule/register, organized by specification section, listing all items to be furnished for review and approval by A/E and Owner. The list shall include Shop Drawings, manufacturer’s literature, certificates of compliance, materials Samples, materials colors, guarantees, and all other items identified throughout the Specifications.

8.3.1.2 Contractor shall indicate the type of item, Contract requirements reference, and Contractor’s scheduled dates for submitting the item along with the requested dates for approval answers from A/E and
Owner. The submittal register shall indicate the projected dates for procurement of all included items and shall be updated at least monthly with actual approval and procurement dates. Contractor’s Submittal Register must be reasonable in terms of the review time for complex submittals. Contractor’s submittal schedule must be consistent with the Work Progress Schedule and identify critical submittals. Show and allow a minimum of fifteen (15) calendar days duration after receipt by A/E and ODR for review and approval. If resubmittal required, allow a minimum of an additional fifteen (15) calendar days for review. Submit the updated Submittal Register with each request for progress payment. Owner may establish routine review procedures and schedules for submittals at the preconstruction conference and/or elsewhere in the Contract Documents. If Contractor fails to update and provide the Submittal Register as required, Owner may, after seven (7) days notice to Contractor withhold a reasonable sum of money that would otherwise be due Contractor.

8.3.1.3 Contractor shall coordinate the Submittal Register with the Work Progress Schedule. Do not schedule Work requiring a submittal to begin prior to scheduling review and approval of the related submittal. Revise and/or update both schedules monthly to ensure consistency and current project data. Provide to ODR the updated Submittal Register and schedule with each application for progress payment. Refer to requirements for the Work Progress Schedule for inclusion of procurement activities therein. Regardless, the Submittal Register shall identify dates submitted and returned and shall be used to confirm status and disposition of particular items submitted, including approval or other action taken and other information not conveniently tracked through the Work Progress Schedule.

8.3.1.4 By submitting Shop Drawings, Samples or other required information, Contractor represents that it has determined and verified all applicable field measurements, field construction criteria, materials, catalog numbers and similar data to the extent possible from existing conditions and design information provided by A/E prior to fabrication; and has checked and coordinated each Shop Drawing and Sample with the requirements of the Work and the Contract Documents.

8.3.2 Review of Submittals. A/E and ODR review is only for conformance with the design concept and the information provided in the Contract Documents. Responses to submittals will be in writing. The approval of a separate item does not indicate approval of an assembly in which the item functions. The approval of a submittal does not relieve Contractor of responsibility for any deviation from the requirements of the Contract unless Contractor informs A/E and ODR of such deviation in a clear, conspicuous, and written manner on the submittal transmittal and at the time of submission, and obtains Owner’s
written specific approval of the particular deviation.

8.3.3 **Correction and Resubmission.** Contractor shall make any corrections required to a submittal and resubmit the required number of corrected copies promptly so as to avoid delay, until submittal approval. Direct attention in writing to A/E and ODR, when applicable, to any new revisions other than the corrections requested on previous submissions.

8.3.4 **Limits on Shop Drawing Review.** Contractor shall not commence any Work requiring a submittal until review of the submittal is fully executed under Subsection 8.3.2. Construct all such work in accordance with reviewed submittals. Comments incorporated as part of the review in Subsection 8.3.2 of Shop Drawings and Samples is not authorization to Contractor to perform extra work or changed work unless authorized through a Change Order. A/E’s and ODR’s review, if any, does not relieve Contractor from responsibility for defects in the Work resulting from errors or omissions of any kind on the submittal, regardless of any approval action. A/E or ODR shall not make formal changes to the Contract Documents via the submittal process. Changes to the Construction Documents shall be accomplished via Section 3.2.2 and Article 11 Changes.

8.3.5 **No Substitutions Without Approval.** ODR and A/E may receive and consider Contractor’s request for substitution when Contractor agrees to reimburse Owner for review costs and satisfies the requirements of this section. If Contractor does not satisfy these conditions, ODR and A/E will return the request without action except to record noncompliance with these requirements. Owner will not consider the request if Contractor cannot provide the product or method because of failure to pursue the Work promptly or coordinate activities properly. Contractor’s request for a substitution may be considered by ODR and A/E when:

8.3.5.1 The Contract Documents do not require extensive revisions; and

8.3.5.2 Proposed changes are in keeping with the general intent of the Contract Documents and the design intent of A/E and do not result in an increase in cost to Owner; and

8.3.5.3 The request is timely, fully documented, properly submitted and one or more of the following apply:

8.3.5.3.1 Contractor cannot provide the specified product, assembly or method of construction within the Contract Time;

8.3.5.3.2 The request directly relates to an “or-equal” clause or similar language in the Contract Documents;

8.3.5.3.3 The request directly relates to a “product design standard” or “performance standard” clause in the Contract.
8.3.5.3.4 The requested substitution offers Owner a substantial advantage in cost, time, energy conservation or other considerations, after deducting additional responsibilities Owner must assume;

8.3.5.3.5 The specified product or method of construction cannot receive necessary approval by an authority having jurisdiction, and ODR can approve the requested substitution;

8.3.5.3.6 Contractor cannot provide the specified product, assembly or method of construction in a manner that is compatible with other materials and where Contractor certifies that the substitution will overcome the incompatibility;

8.3.5.3.7 Contractor cannot coordinate the specified product, assembly or method of construction with other materials and where Contractor certifies they can coordinate the proposed substitution; or

8.3.5.3.8 The specified product, assembly or method of construction cannot provide a warranty required by the Contract Documents and where Contractor certifies that the proposed substitution provides the required warranty.

8.3.5.3.9 The manufacturer of the specified product has been removed from production due to cancellation or obsolescence.

8.3.6 Unauthorized Substitutions at Contractor's Risk. Contractor is financially responsible for any additional costs or delays resulting from unauthorized substitution of materials, equipment or fixtures other than those specified. Contractor shall reimburse Owner for any increased design or contract administration costs resulting from such unauthorized substitutions.

8.4 Field Mock-up.

8.4.1 Mock-ups shall be constructed prior to commencement of a specified scope of work to confirm acceptable workmanship.

8.4.1.1 As a minimum, field mock-ups shall be constructed for roofing systems, exterior veneer / finish systems, glazing systems, and any other Work requiring a mock-up as identified throughout the Contract Documents. Mock-ups for systems not part of the Project scope shall not be required.

8.4.1.2 Mock-ups may be incorporated into the Work if allowed by the
Contract Documents and if acceptable to ODR. If mock-ups are freestanding, they shall remain in place until otherwise directed by Owner.

8.4.1.3 Contractor shall include field mock-ups in their Work Progress Schedule and shall notify ODR and A/E of readiness for review sufficiently in advance to coordinate review without delay.

8.5 Inspection During Construction.

8.5.1 Contractor shall provide sufficient, safe, and proper facilities, including equipment as necessary for safe access, at all reasonable times for observation and/or inspection of the Work by Owner and its agents. "Reasonable times" of inspection allow for sufficient monitoring of the quality of materials and installation without substantially impeding the progress of the Work.

8.5.2 Contractor shall not cover up any Work with finishing materials or other building components prior to providing Owner and its agents an opportunity to perform an inspection of the Work.

8.5.2.1 Should corrections of the Work be required for approval, Contractor shall not cover-up corrected Work until Owner indicates approval.

8.5.2.2 Contractor shall provide notification of at least five (5) working days or otherwise as mutually agreed, to ODR of the anticipated need for a cover-up inspection. Should ODR fail to make the necessary inspection within the agreed period, Contractor may proceed with cover-up Work after making every reasonable effort to contact the ODR and after documenting the Work, but is not relieved of responsibility for Work to comply with requirements of the Contract Documents.
Article 9. Construction Schedules

9.1 **Contract Time. TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT.** The Contract Time is the time between the dates indicated in the Notice to Proceed for commencement of the Work and for achieving Substantial Completion. The Contract Time can be modified only by Change Order. Failure to achieve Substantial Completion within the Contract Time as otherwise agreed to in writing will cause damage to Owner and may subject Contractor to liquidated damages as provided in the Contract Documents. If Contractor fails to achieve Final Completion within thirty (30) calendar days after Substantial Completion or a mutually agreed upon longer period of time between Contractor and Owner, Contractor shall be responsible for Owner’s additional inspection, project management, and maintenance cost to the extent caused by Contractor’s failure to achieve Final Completion.

9.2 **Notice to Proceed.** Owner will issue a Notice to Proceed which shall state the dates for beginning Work and for achieving Substantial Completion of the Work.

9.3 **Work Progress Schedule.** Refer to Supplementary General Conditions or Special Conditions for additional schedule requirements. Unless indicated otherwise in those documents, Contractor shall submit their initial Work Progress Schedule for the Work in relation to the entire Project not later than twenty-one (21) days after the effective date of the Notice to Proceed to ODR and A/E. Unless otherwise indicated in the Contract Documents, the Work Progress Schedule shall be computerized Critical Path Method (CPM) with fully editable logic. This initial schedule shall indicate the dates for starting and completing the various aspects required to complete the Work, including mobilization, procurement, installation, testing, inspection, delivery of Close-out Documents and acceptance of all the Work of the Contract. When acceptable to Owner, the initially accepted schedule shall be the Baseline Schedule for comparison to actual conditions throughout the Contract duration.

9.3.1 **Schedule Requirements.** Contractor shall submit electronic and paper copy of the initial Work Progress Schedule reflecting accurate and reliable representations of the planned progress of the Work, the Work to date if any, and of Contractor’s actual plans for its completion. Contractor shall organize and provide adequate detail so the schedule is capable of measuring and forecasting the effect of delaying events on completed and uncompleted activities.

9.3.1.1 Contractor shall resubmit initial schedule as required to address review comments from A/E and ODR until such schedule is accepted as the Baseline Schedule.

9.3.1.2 Submittal of a schedule, schedule revision or schedule update constitutes Contractor's representation to Owner of the accurate depiction of all progress to date and that Contractor will follow the schedule as submitted in performing the Work.
9.3.2 Schedule Updates. Contractor shall update the Work Progress Schedule and the Submittal Register monthly, as a minimum, to reflect progress to date and current plans for completing the Work, while maintaining original schedule as Baseline Schedule and submit paper and electronic copies of the update to A/E and ODR as directed, but as a minimum with each request for payment. Owner has no duty to make progress payments unless accompanied by the updated Work Progress Schedule. Show the anticipated date of completion reflecting all extensions of time granted through Change Order as of the date of the update. Contractor may revise the Work Progress Schedule when in Contractor’s judgment it becomes necessary for the management of the Work. Contractor shall identify all proposed changes to schedule logic to Owner and to A/E via an executive summary accompanying the updated schedule for review prior to final implementation of revisions into a revised Baseline Schedule. Schedule changes that materially impact Owner’s operations shall be communicated promptly to ODR and shall not be incorporated into the revised Baseline Schedule without ODR’s consent.

9.3.3 The Work Progress Schedule is for Contractor’s use in managing the Work and submittal of the schedule, and successive updates or revisions, is for the information of Owner and to demonstrate that Contractor has complied with requirements for planning the Work. Owner’s acceptance of a schedule, schedule update or revision constitutes Owner’s agreement to coordinate its own activities with Contractor’s activities as shown on the schedule.

9.3.3.1 Acceptance of the Work Progress Schedule, or update and/or revision thereto does not indicate any approval of Contractor’s proposed sequences and duration.

9.3.3.2 Acceptance of a Work Progress Schedule update or revision indicating early or late completion does not constitute Owner’s consent, alter the terms of the Contract, or waive either Contractor’s responsibility for timely completion or Owner’s right to damages for Contractor’s failure to do so.

9.3.3.3 Contractor’s scheduled dates for completion of any activity or the entire Work do not constitute a change in terms of the Contract. Change Orders are the only method of modifying the Substantial Completion Date(s) and Contract Time.

9.4 Ownership of Float. Unless indicated otherwise in the Contract Documents, Contractor shall develop its schedule, pricing, and execution plan to provide a minimum of ten (10) percent total float at acceptance of the Baseline Schedule. Float time contained in the Work Progress Schedule is not for the exclusive benefit of Contractor or Owner, but belongs to the Project and may be consumed by either party as needed on a first-used basis.

9.5 Completion of Work. Contractor is accountable for completing the Work within the Contract Time stated in the Contract, or as otherwise amended by Change Order.
9.5.1 If, in the judgment of Owner, the work is behind schedule and the rate of placement of work is inadequate to regain scheduled progress to insure timely completion of the entire work or a separable portion thereof, Contractor, when so informed by Owner, shall immediately take action to increase the rate of work placement by:

9.5.1.1 An increase in working forces.

9.5.1.2 An increase in equipment or tools.

9.5.1.3 An increase in hours of work or number of shifts.

9.5.1.4 Expedite delivery of materials.

9.5.1.5 Other action proposed if acceptable to Owner.

9.5.2 Within ten (10) days after such notice from ODR, Contractor shall notify ODR in writing of the specific measures taken and/or planned to increase the rate of progress. Contractor shall include an estimate as to the date of scheduled progress recovery and an updated Work Progress Schedule illustrating Contractor’s plan for achieving timely completion of the Project. Should ODR deem the plan of action inadequate, Contractor shall take additional steps or make adjustments as necessary to its plan of action until it meets with ODR’s approval.

9.6 Modification of the Contract Time.

9.6.1 Delays and extension of time as hereinafter described are valid only if executed in accordance with provisions set forth in Article 11.

9.6.2 When a delay defined herein as excusable prevents Contractor from completing the Work within the Contract Time, Contractor is entitled to an extension of time. Owner will make an equitable adjustment and extend the number of days lost because of excusable delay or Weather Days, as measured by Contractor’s progress schedule. All extensions of time will be granted in calendar days. In no event, however, will an extension of time be granted for delays that merely extend the duration of non-critical activities, or which only consume float without delaying the project Substantial Completion date(s).

9.6.2.1 A “Weather Day” is a day on which Contractor’s current schedule indicates Work is to be done, and on which inclement weather and/or related site conditions prevent Contractor from performing seven (7) continuous hours of Work on the critical path between the hours of 7:00 a.m. and 6:00 p.m. Weather days are excusable delays. When weather conditions at the site prevent work from proceeding, Contractor shall immediately notify ODR for confirmation of the conditions. At the end of each calendar month, submit to ODR and A/E a list of Weather Days occurring in that month along with documentation of the impact on critical activities. Based on
confirmation by ODR, any time extension granted will be issued by Change Order. If Contractor and Owner cannot agree on the time extension, Owner may issue a ULCO for fair and reasonable time extension.

9.6.2.2 **Excusable Delay.** Contractor is entitled to an equitable adjustment of the Contract Time, issued via change order, for delays caused by the following:

9.6.2.2.1 Errors, omissions and imperfections in design, which A/E corrects by means of changes in the Drawings and Specifications.

9.6.2.2.2 Unanticipated physical conditions at the Site, which A/E corrects by means of changes to the Drawings and Specifications or for which ODR directs changes in the Work identified in the Contract Documents.

9.6.2.2.3 Failure of Owner to have secured property, right-of-way or easements necessary for Work to begin or progress.

9.6.2.2.4 Changes in the Work that effect activities identified in Contractor's schedule as “critical” to completion of the entire Work, if such changes are ordered by ODR or recommended by A/E and ordered by ODR.

9.6.2.2.5 Suspension of Work for unexpected natural events, Force Majeure (sometimes called “acts of God”), civil unrest, strikes or other events which are not within the reasonable control of Contractor.

9.6.2.2.6 Suspension of Work for convenience of ODR, which prevents Contractor from completing the Work within the Contract Time.

9.6.2.2.7 Administrative delays caused by activities or approval requirements related to an Authority Having Jurisdiction.

9.6.3 Contractor's relief in the event of such delays is the time impact to the critical path as determined by analysis of Contractor's schedule. In the event that Contractor incurs additional direct costs because of the excusable delays other than described in Subparagraph 9.6.2.2.4 and within the reasonable control of Owner, the Contract price and Contract Time are to be equitably adjusted by Owner pursuant to the provisions of Article 11.

9.7 **No Damages for Delay.** Contractor has no claim for monetary damages for delay or hindrances to the work from any cause, including without limitation any act or omission of Owner.
9.8 Concurrent Delay. When the completion of the Work is simultaneously delayed by an excusable delay and a delay arising from a cause not designated as excusable, Contractor may not be entitled to a time extension for the period of concurrent delay.

9.9 Other Time Extension Requests. Time extensions requested in association with changes to the Work directed or requested by Owner shall be included with Contractor’s proposed costs for such change. Time extensions requested for inclement weather are covered by Paragraph 9.6.2.1 above. If Contractor believes that the completion of the Work is delayed by a circumstance other than for changes directed to the Work or weather, they shall give ODR written notice, stating the nature of the delay and the activities potentially affected, within five (5) days after the onset of the event or circumstance giving rise to the excusable delay. Contractor shall provide sufficient written evidence to document the delay. In the case of a continuing cause of delay, only one claim is necessary. State claims for extensions of time in numbers of whole or half days.

9.9.1 Within ten (10) days after the cessation of the delay, Contractor shall formalize its request for extension of time in writing to include a full analysis of the schedule impact of the delay and substantiation of the excusable nature of the delay. All changes to the Contract Time or made as a result of such claims is by Change Order, as set forth in Article 11.

9.9.2 No extension of time releases Contractor or the Surety furnishing a performance or payment bond from any obligations under the Contract or such a bond. Those obligations remain in full force until the discharge of the Contract.

9.9.3 Contents of Time Extension Requests. Contractor shall provide with each Time Extension Request a quantitative demonstration of the impact of the delay on project completion time, based on the Work Progress Schedule. Contractor shall include with Time Extension Requests a reasonably detailed narrative setting forth:

9.9.3.1 The nature of the delay and its cause; the basis of Contractor’s claim of entitlement to a time extension.

9.9.3.2 Documentation of the actual impacts of the claimed delay on the critical path indicated in Contractor’s Work Progress Schedule, and any concurrent delays.

9.9.3.3 Description and documentation of steps taken by Contractor to mitigate the effect of the claimed delay, including, when appropriate, the modification of the Work Progress Schedule.

9.9.4 Owner’s Response. Owner will respond to the Time Extension Request by providing to Contractor written notice of the number of days granted, if any, and giving its reason if this number differs from the number of days requested by Contractor.

9.9.4.1 Owner will not grant time extensions for delays that do not affect the
Contract Substantial Completion date.

9.9.4.2 Owner will respond to each properly submitted Time Extension Request within fifteen (15) days following receipt. If Owner cannot reasonably make a determination about Contractor's entitlement to a time extension within that time, Owner will notify Contractor in writing. Unless otherwise agreed by Contractor, Owner has no more than fifteen (15) additional days to prepare a final response. If Owner fails to respond within forty-five (45) days from the date the Time Extension Request is received, Contractor is entitled to a time extension in the amount requested.

9.10 **Failure to Complete Work Within the Contract Time.** **TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT.** Contractor's failure to substantially complete the Work within the Contract Time or to achieve Substantial Completion as required will cause damage to Owner. These damages shall be liquidated by agreement of Contractor and Owner, in the amount per day as set forth in the Contract Documents.

9.11 **Liquidated Damages.** Owner may collect liquidated damages due from Contractor directly or indirectly by reducing the Contract Sum in the amount of liquidated damages stated in the Supplementary General Conditions or Special Conditions.
Article 10. Payments

10.1 Schedule of Values. Contractor shall submit to ODR and A/E for acceptance a Schedule of Values accurately itemizing material and labor for the various classifications of the Work based on the organization of the specification sections and of sufficient detail acceptable to ODR. The accepted Schedule of Values will be the basis for the progress payments under the Contract.

10.1.1 No progress payments will be made prior to receipt and acceptance of the Schedule of Values, provided in such detail as required by ODR, and submitted not less than twenty-one (21) days prior to the first request for payment. The Schedule of Values shall follow the order of trade divisions of the Specifications and include itemized costs for general conditions, costs for preparing close out documents, staff training, if required, fees, contingencies, and Owner cash allowances, if applicable, so that the sum of the items will equal the Contract price. As appropriate, assign each item labor and/or material values, the subtotal thereof equaling the value of the work in place when complete.

10.1.1.1 Owner requires that the Work items be inclusive of the cost of the Work items only. Any contract markups for overhead and profit, general conditions, etc., shall be contained within separate line items for those specific purposes which shall be divided into at least two (2) lines, one (1) for labor and one (1) for materials.

10.1.2 Contractor shall retain a copy of all worksheets used in preparation of its bid or proposal, supported by a notarized statement that the worksheets are true and complete copies of the documents used to prepare the bid or proposal. Make the worksheets available to ODR at the time of Contract execution. Thereafter Contractor shall grant Owner during normal business hours access to said copy of worksheets at any time during the period commencing upon execution of the Contract and ending one year after final payment.

10.2. Progress Payments. Contractor will receive periodic progress payments for Work performed, materials in place, suitably stored on Site, or as otherwise agreed to by Owner and Contractor. Payment is not due until receipt by ODR or his designee of a correct and complete Pay Application in electronic and/or hard copy format as set forth in Supplementary General Conditions, Special Conditions, and certified by A/E. Progress payments are made provisionally and do not constitute acceptance of work not in accordance with the Contract Documents. Owner will not process progress payment applications for Change Order Work until all parties execute the Change Order.

10.2.1 Preliminary Pay Worksheet. Once each month that a progress payment is to be requested, the Contractor shall submit to A/E and ODR a complete, clean copy of a preliminary pay worksheet or preliminary pay application, to include the following:
10.2.1.1 Contractor’s estimate of the amount of Work performed, labor furnished and materials incorporated into the Work, using the established Schedule of Values;

10.2.1.2 An updated Work Progress Schedule including the executive summary and all required schedule reports;

10.2.1.3 HUB subcontracting plan Progress Assessment Report as required in Paragraph 4.2.5.1;

10.2.1.4 Such additional documentation as Owner may require as set forth in the Supplementary General Conditions or elsewhere in the Contract Documents; and

10.2.1.5 Construction payment affidavit. The referenced affidavit is the Contractor’s Progress Payment Affidavit.

10.2.2 Contractor’s Application for Payment. As soon as practicable, but in no event later than seven (7) days after receipt of the preliminary pay worksheet, A/E and ODR will meet with Contractor to review the preliminary pay worksheet and to observe the condition of the Work. Based on this review, ODR and A/E may require modifications to the preliminary pay worksheet prior to the submittal of an Application for Payment, and will promptly notify Contractor of revisions necessary for approval. As soon as practicable, Contractor shall submit its Application for Payment on the appropriate and completed form, reflecting the required modifications to the Schedule of Values required by A/E and/or ODR. Attach all additional documentation required by ODR and/or A/E, as well as an affidavit affirming that all payrolls, bills for labor, materials, equipment, subcontracted work and other indebtedness connected with Contractor’s Application for Payment are paid or will be paid within the time specified in Tex. Gov’t Code, Ch. 2251. No Application for Payment is complete unless it fully reflects all required modifications, and attaches all required documentation including Contractor’s affidavit.

10.2.3 Certification by Architect/Engineer. Within five (5) days or earlier following A/E’s receipt of Contractor’s formal Application for Payment, A/E will review the Application for Payment for completeness, and forward it to ODR. A/E will certify that the application is complete and payable, or that it is incomplete, stating in particular what is missing. If the Application for Payment is incomplete, Contractor shall make the required corrections and resubmit the Application for Payment for processing.

10.3 Owner’s Duty to Pay. Owner has no duty to pay the Contractor except on receipt by ODR of: 1) a complete Application for Payment certified by A/E; 2) Contractor’s updated Work Progress Schedule; and 3) confirmation that Contractor’s record documentation at the Site is kept current.
10.3.1 Payment for stored materials and/or equipment confirmed by Owner and A/E to be on-site or otherwise properly stored is limited to eighty-five (85) percent of the invoice price or eighty-five (85) percent of the scheduled value for the materials or equipment, whichever is less.

10.3.2 Retainage. Owner will withhold from each progress payment, as retainage, five (5) percent of the total earned amount, the amount authorized by law, or as otherwise set forth in the Supplementary General Conditions or Special Conditions. Retainage is managed in conformance with Tex. Gov't Code, Ch. 2252, Subch. B. **The Owner shall withhold as retainage ten percent (10%) of the amount of each progress payment on all contracts estimated at time of execution to cost less than $400,000 and five percent (5%) of the amount of each progress payment on all contracts estimated at the time of execution to cost $400,000 or more.**

10.3.2.1 Contractor shall provide written consent of its surety for any request for reduction or release of retainage.

10.3.2.2 At least sixty-five (65) percent of the Contract, or such other discrete Work phase as set forth in Subsection 12.1.6 or Work package delineated in the Contract Documents, must be completed before Owner can consider a retainage reduction or release.

10.3.2.3 Contractor shall not withhold retainage from their Subcontractors and suppliers in amounts that are any percentage greater than that withheld in its Contract with Owner under this subsection, unless otherwise acceptable to Owner.

10.3.3 Price Reduction to Cover Loss. Owner may reduce any Application for Payment, prior to payment to the extent necessary to protect Owner from loss on account of actions of Contractor including, but not limited to, the following:

10.3.3.1 Defective or incomplete Work not remedied;

10.3.3.2 Damage to Work of a separate Contractor;

10.3.3.3 Failure to maintain scheduled progress or reasonable evidence that the Work will not be completed within the Contract Time;

10.3.3.4 Persistent failure to carry out the Work in accordance with the Contract Documents;

10.3.3.5 Reasonable evidence that the Work cannot be completed for the unpaid portion of the Contract Sum;

10.3.3.6 Assessment of fines for violations of prevailing wage rate law; or

10.3.3.7 Failure to include the appropriate amount of retainage for that
periodic progress payment.

10.3.3.8 Failure to maintain or allow Owner's inspection of payroll records.

10.3.4 Title to all material and Work covered by progress payments transfers to Owner upon payment.

10.3.4.1 Transfer of title to Owner does not relieve Contractor and its Subcontractors of the sole responsibility for the care and protection of materials and Work upon which payments have been made until substantial completion, responsibility for the care and protection of materials and Work in areas where punch list items are completed until final completion or the restoration of any damaged Work, or waive the right of Owner to require the fulfillment of all the terms of the Contract.

10.4 Progress Payments. Progress payments to Contractor do not release Contractor or its surety from any obligations under the Contract.

10.4.1 Upon Owner's request, Contractor shall furnish manifest proof of the status of Subcontractor's accounts in a form acceptable to Owner.

10.4.2 Pay estimate certificates must be signed by a corporate officer or a representative duly authorized by Contractor.

10.4.3 Provide copies of bills of lading, invoices, delivery receipts or other evidence of the location and value of such materials in requesting payment for materials.

10.4.4 For purposes of Tex. Gov't Code § 2251.021(a)(2), the date the performance of service is complete is the date when ODR approves the Application for Payment.

10.5 Off-Site Storage. With prior approval by Owner and in the event Contractor elects to store materials at an off-site location, abide by the following conditions, unless otherwise agreed to in writing by Owner.

10.5.1 Store materials in a commercial warehouse meeting the criteria stated below.

10.5.2 Provide insurance coverage adequate not only to cover materials while in storage, but also in transit from the off-site storage areas to the Project Site. Copies of duly authenticated certificates of insurance, made out to insure the State agency which is signatory to the Contract, must be filed with Owner's representative.

10.5.3 Inspection by Owner's representative is allowed at any time. Owner's inspectors must be satisfied with the security, control, maintenance, and preservation measures.
10.5.4 Materials for this Project are physically separated and marked for the Project in a sectioned-off area. Only materials which have been approved through the submittal process are to be considered for payment.

10.5.5 Owner reserves the right to reject materials at any time prior to final acceptance of the complete Contract if they do not meet Contract requirements regardless of any previous progress payment made.

10.5.6 With each monthly payment estimate, submit a report to ODR and A/E listing the quantities of materials already paid for and still stored in the off-site location.

10.5.7 Make warehouse records, receipts and invoices available to Owner's representatives, upon request, to verify the quantities and their disposition.

10.5.8 In the event of Contract termination or default by Contractor, the items in storage off-site, upon which payment has been made, will be promptly turned over to Owner or Owner's agents at a location near the jobsite as directed by ODR. The full provisions of performance and payment bonds on this Project cover the materials off-site in every respect as though they were stored on the Project Site.

10.6 **Time for Payment by Contractor Pursuant to Tex. Gov't Code § 2255.022.**

10.6.1 Contractor who receives a payment from a governmental entity shall pay Subcontractor the appropriate share of the payment not later than the tenth (10th) day after the date Contractor receives the payment.

10.6.2 The appropriate share is overdue on the eleventh (11th) day after the date Contractor receives the payment.
Article 11. Changes

11.1 Change Orders. A Change Order issued after execution of the Contract is a written order to Contractor, signed by ODR, Contractor, and A/E, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time can only be changed by Change Order. A Change Order signed by Contractor indicates his agreement therewith, including the adjustment in the Contract Sum and/or the Contract Time. ODR may issue a written authorization for Contractor to proceed with Work of a Change Order in advance of final execution by all parties in accordance with Section 11.9.

11.1.1 Owner, without invalidating the Contract, and without approval of the Contractor's Surety, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, and the Contract Sum and the Contract Time will be adjusted accordingly. All such changes in the Work shall be authorized by Change Order or ULCO, and shall be performed under the applicable conditions of the Contract Documents. If such changes cause an increase or decrease in Contractor’s cost of, or time required for, performance of the Contract, an equitable adjustment shall be made and confirmed in writing in a Change Order or a ULCO.

11.1.2 It is recognized by the parties hereto and agreed by them that the Specifications and Drawings may not be complete or free from errors, omissions and imperfections or that they may require changes or additions in order for the Work to be completed to the satisfaction of Owner and that, accordingly, it is the express intention of the parties, notwithstanding any other provisions in this Contract, that any errors, omissions or imperfections in such Specifications and Drawings, or any changes in or additions to same or to the Work ordered by Owner and any resulting delays in the Work or increases in Contractor’s costs and expenses arising out of such errors, shall not constitute or give rise to any claim, demand or cause of action of any nature whatsoever in favor of Contractor, whether for breach of Contract, or otherwise; provided, however, that Owner shall be liable to Contractor for the sum stated to be due Contractor in any Change Order approved and signed by both parties, it being agreed hereby that such sum, together with any extension of time contained in said Change Order, shall constitute full compensation to Contractor for all costs, expenses and damages to Contractor, as permitted under Tex. Gov't Code, Ch. 2260.

11.1.3 Procedures for administration of Change Orders shall be established by Owner and stated in Supplementary General Conditions, Special Conditions, or elsewhere in the Contract Documents. Procedures for administration of Change Orders will be provided at the Pre-Construction Conference.

11.1.4 No verbal order, verbal statement, or verbal direction of Owner or his duly appointed representative shall be treated as a change under this article or entitle Contractor to an adjustment.
11.1.5 Contractor agrees that Owner or any of its duly authorized representatives shall have access and the right to examine any directly pertinent books, documents, papers, and records of Contractor. Further, Contractor agrees to include in all its subcontracts a provision to the effect that Subcontractor agrees that Owner or any of its duly authorized representatives shall have access to and the right to examine any directly pertinent books, documents, papers and records of such Subcontractor relating to any claim arising from the Contract, whether or not the Subcontractor is a party to the claim. The period of access and examination described herein which relates to appeals under the Disputes article of the Contract, litigation, or the settlement of claims arising out of the performance of the Contract shall continue until final disposition of such claims, appeals or litigation.

11.2 **Unit Prices.** If unit prices are stated in the Contract Documents or subsequently agreed upon, and if the quantities originally contemplated are so changed in a Proposed Change Order that application of the agreed unit prices to the quantities of work proposed will cause substantial inequity to Owner or Contractor, the applicable unit prices shall be equitably adjusted as provided in the Supplementary General Conditions or Special Conditions or as agreed to by the parties and incorporated into a Change Order.

11.3 **Claims for Additional Costs.**

11.3.1 If Contractor wishes to make a claim for an increase in the Contract Sum not related to a requested change, they shall give Owner and A/E written notice thereof within twenty-one (21) days after the occurrence of the event giving rise to such claim, but, in any case before proceeding to execute the Work considered to be additional cost or time, except in an emergency endangering life or property in which case Contractor shall act in accordance with Subsection 7.2.1. No such claim shall be valid unless so made. If Owner and Contractor cannot agree on the amount of the adjustment in the Contract Sum, it shall be determined as set forth under Article 15. Any change in the Contract Sum resulting from such claim shall be authorized by a Change Order or a ULCO.

11.3.2 If Contractor claims that additional cost is involved because of, but not limited to, 1) any written interpretation of the Contract Documents, 2) any order by Owner to stop the Work pursuant to Article 14 where Contractor was not at fault, or 3) any written order for a minor change in the Work issued pursuant to Section 11.4, Contractor shall make such claim as provided in Subsection 11.3.1.

11.3.3 Should Contractor or his Subcontractors fail to call attention of A/E to discrepancies or omissions in the Contract Documents, but claim additional costs for corrective Work after Contract award, Owner may assume intent to circumvent competitive bidding for necessary corrective Work. In such case, Owner may choose to let a separate Contract for the corrective Work, or issue a ULCO to require performance by Contractor. Claims for time extensions or
for extra cost resulting from delayed notice of patent Contract Document discrepancies or omissions will not be considered by Owner.

11.4 Minor Changes. A/E, with concurrence of ODR, will have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time. Such changes shall be effected by written order which Contractor shall carry out promptly and record on As-Built record documents.

11.5 Concealed Site Conditions. Contractor is responsible for visiting the Site and being familiar with local conditions such as the location, accessibility, and general character of the Site and/or building. If, in the performance of the Contract, subsurface, latent, or concealed conditions at the Site are found to be materially different from the information included in the Contract Documents, or if unknown conditions of an unusual nature are disclosed differing materially from the conditions usually inherent in Work of the character shown and specified, ODR and A/E shall be notified in writing of such conditions before they are further disturbed or subsequent related work proceeds. Upon such notice, or upon its own observation of such conditions, A/E, with the approval of ODR, will promptly make such changes in the Drawings and Specifications as they deem necessary to conform to the different conditions, and any increase or decrease in the cost of the Work, or in the time within which the Work is to be completed, resulting from such changes will be adjusted by Change Order, subject to the prior approval of ODR.

11.6 Extension of Time. All changes to the Contract Time shall be made as a consequence of requests as required under Section 9.6, and as documented by Change Order as provided under Section 11.1.

11.7 Administration of Change Order Requests. All changes in the Contract shall be administered in accordance with procedures approved by Owner, and when required, make use of such electronic information management system(s) as Owner may employ.

11.7.1 Routine changes in the construction Contract shall be formally initiated by A/E by means of a PCO form detailing requirements of the proposed change for pricing by Contractor. This action may be preceded by communications between Contractor, A/E and ODR concerning the need and nature of the change, but such communications shall not constitute a basis for beginning the proposed Work by Contractor. Except for emergency conditions described below, approval of Contractor’s cost proposal by A/E and ODR will be required for authorization to proceed with the Work being changed. Owner will not be responsible for the cost of Work changed without prior approval and Contractor may be required to remove Work so installed.

11.7.2 All proposed costs for change order Work must be supported by itemized accounting of material, equipment and associated itemized installation costs in sufficient detail, following the outline and organization of the established Schedule of Values, to permit analysis by A/E and ODR using current estimating guides and/or practices. Photocopies of Subcontractor and vendor proposals shall be furnished unless specifically waived by ODR. Contractor
shall provide written response to a change request within twenty-one (21) days of receipt.

11.7.3 Any unexpected circumstance which necessitates an immediate change in order to avoid a delay in progress of the Work may be expedited by verbal communication and authorization between Contractor and Owner, with written confirmation following within twenty-four (24) hours. A limited scope not-to-exceed estimate of cost and time will be requested prior to authorizing Work to proceed. Should the estimate be impractical for any reason, ODR may authorize the use of detailed cost records of such work to establish and confirm the actual costs and time for documentation in a formal Change Order.

11.7.4 Emergency changes to save life or property may be initiated by Contractor alone (see Section 7.3) with the claimed cost and/or time of such work to be fully documented as to necessity and detail of the reported costs and/or time.

11.7.5 The method of incorporating approved Change Orders into the parameters of the accepted Schedule of Values must be coordinated and administered in a manner acceptable to ODR.

11.8 **Pricing Change Order Work.** The amounts that Contractor and/or its Subcontractor adds to a Change Order for profit and overhead will also be considered by Owner before approval is given. The amounts established hereinafter are the maximums that are acceptable to Owner.

11.8.1 For Work performed by its forces, Contractor will be allowed their actual costs for materials, the total amount of wages (including benefits) paid for labor, plus the total cost of State and Federal payroll taxes and of worker’s compensation and comprehensive general liability insurance, plus additional bond and builders risk insurance cost if the change results in an increase in the premium paid by Contractor. To the total of the above costs, Contractor will be allowed to add a percentage as noted below to cover overhead and profit combined. Allowable percentages for overhead and profit on any specific change shall not exceed fifteen (15) percent for the first $10,000 of value for self-performed work or portion thereof, ten (10) percent for the second $10,000 of value for self-performed work or portion thereof and seven and a half (7.5) percent for any value of the self-performed work that exceeds $20,000.

11.8.2 For subcontracted Work each affected Subcontractor shall figure its costs, overhead and profit as described above for Contractor’s Work, all Subcontractor costs shall be combined, and to that total Subcontractor cost Contractor will be allowed to add a maximum mark-up of ten (10) percent for the first $10,000 of subcontracted Work value or portion thereof, seven and half (7.5) percent for the second $10,000 of subcontracted Work value or portion thereof, and five (5) percent for any value of the subcontracted Work exceeding $20,000.

11.8.3 On changes involving both additions and deletions, percentages for overhead and profit will be allowed only on the net addition. Owner does
not accept and will not pay for additional Contract cost identified as indirect or consequential damages.

11.8.4 For Contracts based on a Guaranteed Maximum Price (GMP), the Construction Manager-at-Risk or Design Builder shall NOT be entitled to a percentage mark-up on any Change Order Work unless the Change Order increases the Guaranteed Maximum Price.

11.8.5 *If the parties cannot agree on an equitable adjustment for labor hours attributable to a change, they shall use the Means Facility Cost Data as a guide for labor hours as a basis of negotiation.*

11.9 **Unilateral Change Order (ULCO).** Owner may issue a written ULCO directing a change in the Work prior to reaching agreement with Contractor on the adjustment, if any, in the Contract price and/or the Contract Time.

11.9.1 Owner and Contractor shall negotiate for appropriate adjustments, as applicable, to the Contract Sum or the Contract Time arising out of a ULCO. As the changed Work is performed, Contractor shall submit its costs for such Work with its Application for Payment beginning with the next Application for Payment within thirty (30) days of the issuance of the ULCO. The Parties reserve their rights as to the disputed amount, subject to Article 15.

11.10 **Final Resolution of Changes.** Upon execution of a Change Order and/or a ULCO by Owner, Contractor and A/E, all costs and time issues regarding that change are final and not subject to additive adjustments.
Article 12. Project Completion and Acceptance

12.1 Closing Inspections.

12.1.1 Substantial Completion Inspection. When Contractor considers the entire Work or part thereof Substantially Complete, it shall notify ODR in writing fifteen (15) working days prior to the Substantial Completion inspection that the Work will be ready for Substantial Completion inspection on a specific date. Contractor shall include with this notice Contractor’s Punchlist to indicate that it has previously inspected all the Work associated with the request for inspection, noting items it has corrected and included all remaining work items with date scheduled for completion or correction prior to final inspection. The failure to include any items on this list does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents. If any of the items on this list prevents the Project from being used as intended, Contractor shall request a Substantial Completion Inspection. Owner and its representatives will review the list of items and schedule the requested inspection, or inform Contractor in writing that such an inspection is premature because the Work is not sufficiently advanced or conditions are not as represented on Contractor’s list.

12.1.1.1 Prior to the Substantial Completion inspection and as specified in the Special Conditions, Contractor shall furnish a copy of its marked-up Record As-Built Documents and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties, and like publications or parts for all installed equipment, systems, and like items as described in the Contract Documents. Delivery of these items is a prerequisite for requesting the Substantial Completion inspection.

12.1.1.2 On the date requested by Contractor, or as mutually agreed upon pending the status of the Open Items List, A/E, ODR, Contractor, and other Owner representatives as determined by Owner will jointly attend the Substantial Completion inspection, which shall be conducted by ODR or their delegate. If ODR determines that the Work is Substantially Complete, ODR will issue a Certificate of Substantial Completion to be signed by A/E, Owner, and Contractor establishing the date of Substantial Completion and identifying responsibilities for security, maintenance, insurance and utilities. A/E will provide with this certificate a consolidated list of Punchlist items (the pre-final Punchlist including all items noted by the various inspecting parties) for completion prior to final inspection. This list may include items in addition to those on Contractor’s Punchlist, which the inspection team deems necessary to correct or complete prior to final inspection. The failure to include any items on this list does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents. If Owner
occupies the Project upon determination of Substantial Completion, Contractor shall complete all corrective Work at the convenience of Owner, without disruption to Owner’s use of the Project for its intended purposes.

12.1.2 Final Inspection. Contractor shall complete the list of items identified on the pre-final Punchlist prior to requesting a final inspection. Unless otherwise specified, or otherwise agreed in writing by the parties as documented on the Certificate of Substantial Completion, Contractor shall complete and/or correct all Work within thirty (30) days of the Substantial Completion date. Upon completion of the pre-final Punchlist work, Contractor shall give written notice to ODR and A/E that the Work will be ready for final inspection on a specific date. Contractor shall accompany this notice with a copy of the updated pre-final Punchlist indicating resolution of all items. On the date specified or as soon thereafter as is practicable, ODR, A/E and Contractor will inspect the Work. A/E will submit to Contractor a final Punchlist of open items that the inspection team requires corrected or completed before final acceptance of the Work.

12.1.2.1 Correct or complete all items on the final Punchlist before requesting Final Payment. Unless otherwise agreed to in writing by the parties, complete this work within seven (7) days of receiving the final Punchlist. Upon completion of the final Punchlist, notify A/E and ODR in writing stating the disposition of each final Punchlist item. A/E, Owner, and Contractor shall promptly inspect the completed items. When the final Punchlist is complete, and the Contract is fully satisfied according to the Contract Documents ODR will issue a certificate establishing the date of Final Completion. Completion of all Work is a condition precedent to Contractor’s right to receive Final Payment.

12.1.3 Annotation. Any Certificate issued under this Article may be annotated to indicate that it is not applicable to specified portions of the Work, or that it is subject to any limitation as determined by Owner.

12.1.4 Purpose of Inspection. Inspection is for determining the completion of the Work, and does not relieve Contractor of its overall responsibility for completing the Work in a good and competent fashion, in compliance with the Contract. Work accepted with incomplete Punchlist items or failure of Owner or other parties to identify Work that does not comply with the Contract Documents or is defective in operation or workmanship does not constitute a waiver of Owner’s rights under the Contract or relieve Contractor of its responsibility for performance or warranties.

12.1.5 Additional Inspections.

12.1.5.1 If Owner’s inspection team determines that the Work is not substantially complete at the Substantial Completion inspection, ODR or A/E will give Contractor written notice listing cause(s) of
the rejection. Contractor will set a time for completion of incomplete or defective work acceptable to ODR. Contractor shall complete or correct all work so designated prior to requesting a second Substantial Completion inspection.

12.1.5.2 If Owner’s inspection team determines that the Work is not complete at the final inspection, ODR or A/E will give Contractor written notice listing the cause(s) of the rejection. Contractor will set a time for completion of incomplete or defective work acceptable to ODR. Contractor shall complete or correct all Work so designated prior to again requesting a final inspection.

12.1.5.3 The Contract contemplates three (3) comprehensive inspections: the Substantial Completion inspection, the Final Completion inspection, and the inspection of completed final Punchlist items. The cost to Owner of additional inspections resulting from the Work not being ready for one or more of these inspections is the responsibility of Contractor. Owner may issue a ULCO deducting these costs from Final Payment. Upon Contractor’s written request, Owner will furnish documentation of any costs so deducted. Work added to the Contract by Change Order after Substantial Completion inspection is not corrective Work for purposes of determining timely completion, or assessing the cost of additional inspections.

12.1.6 **Phased Completion.** The Contract may provide, or Project conditions may warrant, as determined by ODR, that designated elements or parts of the Work be completed in phases. Where phased completion is required or specifically agreed to by the parties, the provisions of the Contract related to closing inspections, occupancy, and acceptance apply independently to each designated element or part of the Work. For all other purposes, unless otherwise agreed by the parties in writing, Substantial Completion of the Work as a whole is the date on which the last element or part of the Work completed receives a Substantial Completion certificate.

Final Completion of the Work as a whole is the date on which the last element or part of the Work completed receives a Final Completion certificate.

12.2 **Owner’s Right of Occupancy.** Owner may occupy or use all or any portion of the Work following Substantial Completion, or at any earlier stage of completion. Should Owner wish to use or occupy the Work, or part thereof, prior to Substantial Completion, ODR will notify Contractor in writing and identify responsibilities for security, maintenance, insurance and utilities. Work performed on the premises by third parties on Owner’s behalf does not constitute occupation or use of the Work by Owner for purposes of this Article. All Work performed by Contractor after occupancy, whether in part or in whole, shall be at the convenience of Owner so as to not disrupt Owner’s use of, or access to occupied areas of the Project.

12.3 **Acceptance and Payment**
12.3.1 Request for Final Payment. Following the certified completion of all work, including all final Punchlist items, cleanup, and the delivery of record As-Built documents, Contractor shall submit a certified Application for Final Payment and include all sums held as retainage and forward to A/E and ODR for review and approval.

12.3.2 Final Payment Documentation. Contractor shall submit, prior to or with the Application for Final Payment, final copies of all close out documents, maintenance and operating instructions, guarantees and warranties, certificates, Reoeeed As-Built Documents and all other items required by the Contract. Contractor shall submit evidence of return of access keys and cards, evidence of delivery to Owner of attic stock, spare parts, and other specified materials. Contractor shall submit consent of surety to Final Payment form and an affidavit that all payrolls, bills for materials and equipment, subcontracted work and other indebtedness connected with the Work, except as specifically noted, are paid, will be paid, after payment from Owner or otherwise satisfied within the period of time required by Tex. Gov't Code, Ch. 2251. Contractor shall furnish documentation establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of claims and liens arising out of the Contract. Contractor may not subsequently submit a claim on behalf of Subcontractor or vendor unless Contractor’s affidavit notes that claim as an exception. The Affidavit referred to above is the Contractor’s Final Payment Affidavit.

12.3.3 Architect/Engineer Approval. A/E will review a submitted Application for Final Payment promptly but in no event later than ten (10) days after its receipt. Prior to the expiration of this deadline, A/E will either: 1) return the Application for Final Payment to Contractor with corrections for action and resubmission; or 2) accept it, note their approval, and send to Owner.

12.3.4 Offsets and Deductions. Owner may deduct from the Final Payment all sums due from Contractor. If the Certificate of Final Completion notes any Work remaining, incomplete, or defects not remedied, Owner may deduct the cost of remedying such deficiencies from the Final Payment. On such deductions, Owner will identify each deduction, the amount, and the explanation of the deduction on or by the twenty-first (21st) day after Owner’s receipt of an approved Application for Final Payment. Such offsets and deductions shall be incorporated via a final Change Order, including a ULCO as may be applicable.

12.3.5 Final Payment Due. Final Payment is due and payable by Owner, subject to all allowable offsets and deductions, on the thirtieth (30th) day following Owner’s approval of the Application for Payment. If Contractor disputes any amount deducted by Owner, Contractor shall give notice of the dispute on or before the thirtieth (30th) day following receipt of Final Payment. Failure to do so will bar any subsequent claim for payment of amounts deducted.

12.3.6 Effect of Final Payment. Final Payment constitutes a waiver of all claims by Owner, relating to the condition of the Work except those arising from:

12.3.6.1 Faulty or defective Work appearing after Substantial Completion
(latent defects);

12.3.6.2 Failure of the Work to comply with the requirements of the Contract Documents;

12.3.6.3 Terms of any warranties required by the Contract, or implied by law; or

12.3.6.4 Claims arising from personal injury or property damage to third parties.

12.3.7 Waiver of Claims. Final payment constitutes a waiver of all claims and liens by Contractor except those specifically identified in writing and submitted to ODR prior to the application for Final Payment.

12.3.8 Effect on Warranty. Regardless of approval and issuance of Final Payment, the Contract is not deemed fully performed by Contractor and closed until the expiration of all warranty periods. Issuance of Final Payment does not alter Contractor’s contractual obligations during the warranty period.
Article 13. Warranty and Guarantee

13.1 Contractor’s General Warranty and Guarantee. Contractor warrants to Owner that all Work is executed in accordance with the Contract, complete in all parts and in accordance with approved practices and customs, and of the required finish and workmanship. Contractor further warrants that unless otherwise specified, all materials and equipment incorporated in the Work under the Contract are new. Owner may, at its option, agree in writing to waive any failure of the Work to conform to the Contract, and to accept a reduction in the Contract price for the cost of repair or diminution in value of the Work by reason of such defect. Absent such a written agreement, Contractor’s obligation to perform and complete the Work in accordance with the Contract Documents is absolute and is not waived by any inspection or observation by Owner, A/E or others, by making any progress payment or final payment, by the use or occupancy of the Work or any portion thereof by Owner, at any time, or by any repair or correction of such defect made by Owner.

13.2 Warranty Period. Except as may be otherwise specified or agreed, Contractor shall repair all defects in materials, equipment, or workmanship appearing within one year from the date of Substantial Completion of the Work or at Final Completion if no Substantial Completion inspection is held. If Substantial Completion occurs by phase, then the warranty period for that particular Work begins on the date of such occurrence, or as otherwise stipulated on the Certificate of Substantial Completion for the particular Work.

13.3 Limits on Warranty. Contractor’s warranty and guarantee hereunder excludes defects or damage caused by:

13.3.1 Modification or improper maintenance or operation by persons other than Contractor, Subcontractors, or any other individual or entity for whom Contractor is not responsible, unless Owner is compelled to undertake maintenance or operation due to the neglect of Contractor.

13.3.2 Normal wear and tear under normal usage after acceptance of the Work by Owner.

13.4 Events Not Affecting Warranty. Contractor’s obligation to perform and complete the Work in a good and workmanlike manner in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of defective Work that is not in accordance with the Contract Documents or a release of Contractor’s obligation to perform the Work in accordance with the Contract Documents:

13.4.1 Observations by Owner and/or A/E;

13.4.2 Recommendation to pay any progress or final payment by A/E;

13.4.3 The issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;
13.4.4 Use or occupancy of the Work or any part thereof by Owner;

13.4.5 Any acceptance by Owner or any failure to do so;

13.4.6 Any review of a Shop Drawing or sample submittal; or

13.4.7 Any inspection, test or approval by others.

13.5 Separate Warranties. If a particular piece of equipment or component of the Work for which the Contract requires a separate warranty is placed in continuous service before Substantial Completion, the warranty period for that equipment or component will not begin until Substantial Completion, regardless of any warranty agreements in place between suppliers and/or Subcontractors and Contractor. ODR will certify the date of service commencement in the Substantial Completion certificate.

13.5.1 In addition to Contractor’s warranty and duty to repair, Contractor expressly assumes all warranty obligations required under the Contract for specific building components, systems and equipment.

13.5.2 Contractor may satisfy any such obligation by obtaining and assigning to Owner a complying warranty from a manufacturer, supplier, or Subcontractor. Where an assigned warranty is tendered and accepted by Owner which does not fully comply with the requirements of the Contract, Contractor remains liable to Owner on all elements of the required warranty not provided by the assigned warranty.

13.6 Correction of Defects. Upon receipt of written notice from Owner, or any agent of Owner designated as responsible for management of the warranty period, of the discovery of a defect, Contractor shall promptly remedy the defect(s), and provide written notice to Owner and designated agent indicating action taken. In case of emergency where delay would cause serious risk of loss or damage to Owner, or if Contractor fails to remedy within thirty (30) days, or within another period agreed to in writing, Owner may correct the defect and be reimbursed the cost of remedying the defect from Contractor or its surety.

13.7 Certification of No Asbestos Containing Materials or Work. Contractor shall ensure compliance with the Asbestos Hazard Emergency Response Act (AHERA– 40 C.F.R § 763-99(7)) from all Subcontractors and materials suppliers, and shall provide a notarized certification to Owner that all equipment and materials used in fulfillment of their Contract responsibilities are non-Asbestos Containing Building Materials (ACBM). This certification must be provided no later than Contractor’s application for Final Payment.
Article 14. Suspension and Termination

14.1 Suspension of Work for Cause. Owner may, at any time without prior notice, suspend all or any part of the Work, if after reasonable observation and/or investigation, Owner determines it is necessary to do so to prevent or correct any condition of the Work, which constitutes an immediate safety hazard, or which may reasonably be expected to impair the integrity, usefulness or longevity of the Work when completed.

14.1.1 Owner will give Contractor a written notice of suspension for cause, setting forth the reason for the suspension and identifying the Work suspended. Upon receipt of such notice, Contractor shall immediately stop the Work so identified. As soon as practicable following the issuance of such a notice, Owner will initiate and complete a further investigation of the circumstances giving rise to the suspension, and issue a written determination of the findings.

14.1.2 If it is confirmed that the cause was within the control of Contractor, Contractor will not be entitled to an extension of time or any compensation for delay resulting from the suspension. If the cause is determined not to have been within the control of Contractor, and the suspension has prevented Contractor from completing the Work within the Contract Time, the suspension is an excusable delay and a time extension will be granted through a Change Order.

14.1.3 Suspension of Work under this provision will be no longer than is reasonably necessary to remedy the conditions giving rise to the suspension.

14.2 Suspension of Work for Owner’s Convenience. Upon seven (7) days written notice to Contractor, Owner may at any time without breach of the Contract suspend all or any portion of the Work for a period of up to thirty (30) days for its own convenience. Owner will give Contractor a written notice of suspension for convenience, which sets forth the number of suspension days for which the Work, or any portion of it, and the date on which the suspension of Work will cease. When such a suspension prevents Contractor from completing the Work within the Contract Time, it is an excusable delay. A notice of suspension for convenience may be modified by Owner at any time on seven (7) days written notice to Contractor. If Owner suspends the Work for its convenience for more than sixty (60) consecutive days, Contractor may elect to terminate the Contract pursuant to the provisions of the Contract.

14.3 Termination by Owner for Cause.

14.3.1 Upon written notice to Contractor and its surety, Owner may, without prejudice to any right or remedy, terminate the Contract and take possession of the Site and of all materials, equipment, tools, construction equipment, and machinery thereon owned by Contractor under any of the following circumstances:
14.3.1 Persistent or repeated failure or refusal, except during complete or partial suspensions of work authorized under the Contract, to supply enough properly skilled workmen or proper materials;

14.3.1.2 Persistent disregard of laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, including ODR;

14.3.1.3 Persistent failure to prosecute the Work in accordance with the Contract, and to ensure its completion within the time, or any approved extension thereof, specified in the Contract;

14.3.1.4 Failure to remedy defective work condemned by ODR;

14.3.1.5 Failure to pay Subcontractors, laborers, and material suppliers pursuant to Tex. Gov’t Code, Ch. 2251;

14.3.1.6 Persistent endangerment to the safety of labor or of the Work;

14.3.1.7 Failure to supply or maintain statutory bonds or to maintain required insurance, pursuant to the Contract;

14.3.1.8 Any material breach of the Contract; or

14.3.1.9 Contractor’s insolvency, bankruptcy, or demonstrated financial inability to perform the Work.

14.3.2 Failure by Owner to exercise the right to terminate in any instance is not a waiver of the right to do so in any other instance.

14.3.3 Should Owner decide to terminate the Contract under the provisions of Section 14.3, it will provide to Contractor and its surety thirty (30) days prior written notice.

14.3.4 Should Contractor or its surety, after having received notice of termination, demonstrate to the satisfaction of Owner that Contractor or its surety are proceeding to correct such default with diligence and promptness, upon which the notice of termination was based, the notice of termination may be rescinded in writing by Owner. If so rescinded, the Work may continue without an extension of time.

14.3.5 If Contractor or its surety fails, after written notice from Owner to commence and continue correction of such default with diligence and promptness to the satisfaction of Owner within thirty (30) days following receipt of notice, Owner may arrange for completion of the Work and deduct the cost of completion from the unpaid Contract Sum.

14.3.5.1 This amount includes the cost of additional Owner costs such as A/E services, other consultants, and contract administration.
14.3.5.2 Owner will make no further payment to Contractor or its surety unless the costs to complete the Work are less than the Contract balance, then the difference shall be paid to Contractor or its surety. If such costs exceed the unpaid balance, Contractor or its surety will pay the difference to Owner.

14.3.5.3 This obligation for payment survives the termination of the Contract.

14.3.5.4 Owner reserves the right in termination for cause to take assignment of all the Contracts between Contractor and its Subcontractors, vendors, and suppliers. ODR will promptly notify Contractor of the contracts Owner elects to assume. Upon receipt of such notice, Contractor shall promptly take all steps necessary to effect such assignment.

14.4 Conversion to Termination for Convenience. In the event that any termination of Contractor for cause under Section 14.3 is later determined to have been improper, the termination shall automatically convert to a termination for convenience under Section 14.5 and Contractor’s recovery for termination shall be strictly limited to the payments allowable under Section 14.5.

14.5 Termination for Convenience of Owner. Owner reserves the right, without breach, to terminate the Contract prior to, or during the performance of the Work, for any reason. Upon such an occurrence, the following shall apply:

14.5.1 Owner will immediately notify Contractor and A/E in writing, specifying the reason for and the effective date of the Contract termination. Such notice may also contain instructions necessary for the protection, storage or decommissioning of incomplete work or systems, and for safety.

14.5.2 Upon receipt of the notice of termination, Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due at that point in the Contract:

14.5.2.1 Stop all work.

14.5.2.2 Place no further subcontracts or orders for materials or services.

14.5.2.3 Terminate all subcontracts for convenience.

14.5.2.4 Cancel all materials and equipment orders as applicable.

14.5.2.5 Take action that is necessary to protect and preserve all property related to the Contract which is in the possession of Contractor.

14.5.3 When the Contract is terminated for Owner’s convenience, Contractor may recover from Owner payment for all Work executed. Contractor may not claim lost profits on other work or lost business opportunities.
14.6 Termination By Contractor. If the Work is stopped for a period of ninety (90) days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of Contractor or Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with Contractor, then Contractor may, upon thirty (30) additional days written notice to ODR, terminate the Contract and recover from Owner payment for all Work executed, but not lost profits on other work or lost business opportunities. If the cause of the Work stoppage is removed prior to the end of the thirty (30) day notice period, Contractor may not terminate the Contract.

14.7 Settlement on Termination. When the Contract is terminated for any reason, at any time prior to one hundred eighty (180) days after the effective date of termination, Contractor shall submit a final termination settlement proposal to Owner based upon recoverable costs as provided under the Contract. If Contractor fails to submit the proposal within the time allowed, Owner may determine the amount due to Contractor because of the termination and pay the determined amount to Contractor.
Article 15. Dispute Resolution

15.1 Unresolved Contractor Disputes. The dispute resolution process provided for in Tex. Gov't Code, Ch. 2260, and the procedures provided in Title 31, Part 2, Chapter 51, Subchapter J of the Texas Administrative or Tex. Civ. Prac. & Rem. Code, Ch. 114, shall be used by Contractor to attempt to resolve any claim for breach of Contract made by Contractor that is not resolved under procedures described throughout the Uniform General Conditions, Supplementary Conditions, or Special Conditions of the Contract.


15.3 Nothing herein shall hinder, prevent, or be construed as a waiver of Owner’s right to seek redress on any disputed matter in a court of competent jurisdiction.

15.4 Nothing herein shall waive or be construed as a waiver of the State’s sovereign immunity.
Article 16. Miscellaneous

16.1 Supplementary General and Special Conditions. When the Work contemplated by Owner is of such a character that the foregoing Uniform General Conditions of the Contract cannot adequately cover necessary and additional contractual relationships, the Contract may include Supplementary General and Special Conditions as described below:

16.1.1 Supplementary General Conditions may describe the standard procedures and requirements of contract administration followed by a contracting agency of the State. Supplementary General Conditions may expand upon matters covered by the Uniform General Conditions, where necessary, provided the expansion does not weaken the character or intent of the Uniform General Conditions. Supplementary General Conditions are of such a character that it is to be anticipated that a contracting agency of the State will normally use the same, or similar, conditions to supplement each of its several projects.

16.1.2 Special Conditions shall relate to a particular Project and be unique to that Project but shall not weaken the character or intent of the Uniform General Conditions.

16.2 Federally Funded Projects. On Federally funded projects, Owner may waive, suspend or modify any Article in these Uniform General Conditions which conflicts with any Federal statute, rule, regulation or procedure, where such waiver, suspension or modification is essential to receipt by Owner of such Federal funds for the Project. In the case of any Project wholly financed by Federal funds, any standards required by the enabling Federal statute, or any Federal rules, regulations or procedures adopted pursuant thereto, shall be controlling.

16.3 Internet-based Project Management Systems. At its option, Owner may administer its design and construction management through an Internet-based management system. In such cases, Contractor shall conduct communication through this media and perform all Project related functions utilizing this database system. This includes correspondence, submittals, Requests for Information, vouchers or payment requests and processing, amendment, Change Orders and other administrative activities.

16.3.1 Accessibility and Administration.

16.3.1.1 When used, Owner will make the software accessible via the Internet to all Project team members.

16.3.1.2 Owner shall administer the software.

16.3.2 Training. When used, Owner shall provide training to the Project team members.

16.4 Administrative Inspections and Audits. Contractor agrees that all relevant records related to this Contract or any work product under this Contract, including practices of
its Subcontractors, shall be subject, at any reasonable time, to inspection, examination, review, audit, and copying at any office or location of Contractor where such records may be found, with or without notice by the Texas State Auditor's Office ("SAO"), the contracting agency or its contracted examiners, or the Office of the Texas Attorney General, and with regard to any federal funding, the relevant federal agency, the Comptroller General, the General Accounting Office, the Office of the Inspector General, or any of their authorized representatives. All Subcontracts shall reflect the requirements of this section. In addition, pursuant to Tex. Gov’t Code§ 2262.003 the SAO may conduct an audit or investigation of any entity receiving funds under this Contract, including direct payments to Contractor and indirect payments under a Subcontract to this Contract; acceptance of such monies acts as acceptance of SAO authority, under legislative audit committee direction, to audit and investigate related to those funds and the entity subject to the audit or investigation must provide SAO with access to any information SAO considers relevant to the scope of the audit or investigation.

End of Uniform General Conditions
2018 SUPPLEMENTARY GENERAL CONDITIONS
TO THE STATE OF TEXAS 2015 EDITION OF THE UNIFORM GENERAL CONDITIONS FOR CONSTRUCTION CONTRACTS

The following Supplementary General Conditions amend and/or supplement the 2015 edition of the Uniform General Conditions for Construction Contracts.

Article 5. Bonds and Insurance

5.2 Insurance Requirements.

Subsection 5.2.4 is supplemented to add the following new paragraphs:

5.2.4.1 Contractor shall deliver to Owner true and complete copies of the General Contractor’s certificates prior to the issuance of any Notice to Proceed.

5.2.4.2 Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor’s obligation to maintain such insurance.

5.2.4.3 The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor’s liability under the indemnities granted to Owner in the Contract Documents.

5.2.4.4 The insurance coverage and limits established in the Uniform General Conditions, Supplementary General Conditions, or Special Conditions shall not be interpreted as any representation or warranty that the insurance coverage and limits necessarily will be adequate to protect Contractor.

Article 2. Wage Rates and Other Laws Governing Construction

Add Section 2.7 as follows:

2.7 Buy America Requirements for Iron and Steel Used in Construction. In accordance with Texas Government Code 2252, Section 2252.202, all iron or steel products (i.e., rolled structural shapes including wide flange beams and columns, angles, bars, plates, sheets, hollow structural sections, pipe, etc.) shall be produced, manufactured and fabricated in the United States.

End of Supplementary General Conditions
Chapter 2258, Texas Government Code, Title 10 requires that state agencies, (including universities), cities, counties, independent school districts, and all other political subdivisions that engage in public works construction projects produce and include prevailing wage rate determinations in the project bidding and contract documents.

Chapter 2258 requires that the contractor who is awarded a contract by a public body and a contractor’s subcontractor shall pay not less than the rates determined by such state agencies to workers employed for the execution of such work. Pursuant to Chapter 2258, Texas Parks and Wildlife has ascertained the following wages to be paid for the various classifications of workers, in the locality of this project. In determining these wages, TPWD has utilized the Prevailing Wage Rates as determined by the U.S. DOL in accordance with the Davis-Bacon Act.

See attached wage rate document.

General Decision Number: TX190133 01/04/2019  TX133

Superseded General Decision Number: TX20180165

State: Texas

Construction Type: Building

County: Dimmit County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.
Modification Number 0 Publication Date 01/04/2019

ASBE0087-002 01/01/2018

Rates Fringes

ASBESTOS WORKER/HEAT & FROST
INSULATOR..........................$ 22.72 10.02

BOIL0074-003 01/01/2017

Rates Fringes

BOILERMAKER......................$ 28.00 22.35

* IRON0066-005 09/01/2018

Rates Fringes

IRONWORKER, REINFORCING AND
STRUCTURAL......................$ 22.05 6.73

LAB00154-001 05/01/2008

Rates Fringes

Laborers: (Mason Tender -
Cement/Concrete)..................$ 12.98 3.49

SUTX2009-020 04/20/2009

Rates Fringes

BRICKLAYER......................$ 17.76 0.00

CARPENTER.......................$ 18.00 0.00

CEMENT MASON/CONCRETE FINISHER...$ 13.27 0.00

ELECTRICIAN.....................$ 15.85 0.00

LABORER: Common or General.....$ 8.50 0.00

LABORER: Landscape &
Irrigation.......................$ 8.50 0.22

LABORER: Mason Tender - Brick...$ 12.02 0.00

LABORER: Mortar Mixer............$ 9.50 0.00

OPERATOR:
Backhoe/Excavator/Trackhoe......$ 13.75 0.00

OPERATOR: Bulldozer.............$ 12.80 0.43

OPERATOR: Crane...................$ 21.33 0.00

OPERATOR: Forklift...............$ 14.58 0.00

OPERATOR: Loader (Front End)...$ 10.54 0.00
PAINTER: Brush, Roller and Spray.......................... $ 15.80 0.00
PLUMBER, Includes HVAC Pipe Installation.................. $ 12.50 0.00
ROOFER............................................. $ 15.10 1.29
SHEET METAL WORKER............................... $ 17.00 0.00
TILE SETTER........................................... $ 15.00 0.00
TRUCK DRIVER......................................... $ 11.24 0.35

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVC" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of
the union which prevailed in the survey for this
classification, which in this example would be Plumbers. 0198
indicates the local union number or district council number
where applicable, i.e., Plumbers Local 0198. The next number,
005 in the example, is an internal number used in processing
the wage determination. 07/01/2014 is the effective date of the
most current negotiated rate, which in this example is July 1,
2014.

Union prevailing wage rates are updated to reflect all rate
changes in the collective bargaining agreement (CBA) governing
this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that
no one rate prevailed for this classification in the survey and
the published rate is derived by computing a weighted average
rate based on all the rates reported in the survey for that
classification. As this weighted average rate includes all
rates reported in the survey, it may include both union and
the rates are survey rates based on a weighted average
calculation of rates and are not majority rates. LA indicates
the State of Louisiana. 2012 is the year of survey on which
these classifications and rates are based. The next number, 007
in the example, is an internal number used in producing the
wage determination. 5/13/2014 indicates the survey completion
date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a
new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate
that no single majority rate prevailed for those
classifications; however, 100% of the data reported for the
classifications was union data. EXAMPLE: UAVG-OH-0010
08/29/2014. UAVG indicates that the rate is a weighted union
average rate. OH indicates the state. The next number, 0010 in
the example, is an internal number used in producing the wage
determination. 08/29/2014 indicates the survey completion
date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of
each year, to reflect a weighted average of the current
negotiated/CBA rate of the union locals from which the rate is
based.
WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.
TEXAS PARKS AND WILDLIFE

AGREEMENT BETWEEN OWNER AND CONTRACTOR

STATE OF TEXAS

COUNTY OF TRAVIS

PROJECT NO. 126476 – Bunkhouse Complex Replacement
PROJECT NO. 126828C – Additive Alternate: Visitor Center Landscaping

THIS AGREEMENT, made this _____ day of ____________, 20__ by and between the STATE OF TEXAS, acting through the TEXAS PARKS AND WILDLIFE DEPARTMENT, hereinafter called the OWNER, and INSERT CONTRACTOR COMPANY NAME, hereinafter called the CONTRACTOR.

WITNESSETH: That for and in consideration of the payments and agreements hereinafter described, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete certain public works described as: Project No. 126476 – Bunkhouse Complex Replacement and Project No. 126828C – Additive Alternate: Visitor Center Landscaping, Chaparral Wildlife Management Area, Dimmit County, Texas, for the use and benefit of the OWNER as described in the Invitation for Bids and Contract Documents and Contract Documents prepared by TEXAS PARKS AND WILDLIFE DEPARTMENT. Contract Documents include all parts of this Invitation for Bids, including but not limited to, Specifications, Scope of Work, Uniform General and Supplementary General Conditions, and Special Conditions for Project Number 126476 – Bunkhouse Complex Replacement and Project No. 126828C – Additive Alternate: Visitor Center Landscaping. The Contract Documents are hereby incorporated by reference into this Contract Number ___________.

In the event that there is a conflict, this contract and its attachments take priority over all other documents. Following the contract in order of priority are the Special Conditions; Supplementary General Conditions, Uniform General Conditions; Invitation for Bids and Contract Documents, and Contractor’s Bid.

The consideration to be paid by the OWNER to the CONTRACTOR for furnishing all the materials, supplies, machinery, equipment, tools, labor, superintendence, insurance, and other accessories and services necessary to complete the said Project in accordance with the Contract Documents is the not to exceed amount of INSERT AMOUNT Dollars and No Cents ($xxx,xxx.xx).

The CONTRACTOR hereby agrees to complete all work within Three Hundred (300) calendar days, commencing on the date specified in OWNER’S written "Notice to Proceed." Time is of the essence with this contract.

The CONTRACTOR further agrees to comply with applicable statutes governing construction contracts including the provisions of V.T.C.A., Texas Government Code, Title 10, Subtitle F, Chapter 2253 requiring Payment Bonds and Performance Bonds; and to comply with all of the Terms and Conditions of this contract.

Payments by OWNER shall be warrants issued by the Comptroller of Public Accounts out of monies appropriated to the Texas Parks and Wildlife Department for such purpose and shall be made upon OWNER’S acceptance of all portions of work as prescribed in the Specifications.

The dispute resolution process provided for in Tex. Gov’t Code, Chapter 2260, and the procedures provided in Title 31, Part 2, Chapter 51, Subchapter J of the Texas Administrative Code shall be used by the Owner and the Contractor to attempt to resolve any claim for breach of contract in an amount less than $250,000.00 made by the Contractor, that is not resolved under procedures described throughout the Terms and Conditions of the Contract. Contract disputes for a claim of $250,000.00 or more shall be governed by Civil Practice and Remedies Code, Chapter 114.
The venue of any suit brought for any breach of this Contract is hereby fixed in any court of competent jurisdiction in Travis County, Texas. All payments under this Contract shall be due and payable in Travis County, Texas.

The Contractor hereby assigns to Owner any and all claims for overcharges associated with this Contract which arise under the antitrust laws of the United States 15 U.S.C.A. SEC. 1 et. seq. (1973).

This Agreement is subject to cancellation, without penalty, either in whole or in part, if funds are not appropriated by the Texas Legislature or otherwise made available to the Texas Parks and Wildlife Department for the specified services under this Agreement.

The said parties for themselves, their heirs, successors, executors, administrators, and assigns, do hereby agree to full performance of the covenants herein contained.

IN WITNESS WHEREOF, the parties to these presents have executed this Contract in two (2) counterparts, each of which shall be deemed an original, in the day and year first above written.

Contractor:

By: ________________________________   Date: ________________________________

Title: ________________________________

Owner: Texas Parks and Wildlife Department

By: ________________________________   Date: ________________________________

Title: ________________________________
TEXAS PARKS AND WILDLIFE

PERFORMANCE BOND

STATE OF TEXAS

COUNTY OF ____________

KNOW ALL MEN BY THESE PRESENTS:

That we, ____________________________________________, as PRINCIPAL,
and ____________________________________________, as SURETY(IES),

Surety Address: ____________________________________________
Surety Phone: ___________________ Surety Fax: ___________________

are hereby held and firmly bound unto the State of Texas in the penal sum of:

$_____________________________ Dollars ($___________________)

for the payment, whereof, the said PRINCIPAL and SURETY(IES) bind themselves, their heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

The conditions of this obligation are such that whereas the PRINCIPAL entered into a certain contract dated ____________________, 20___, hereto attached, and made a part hereof, with the State of Texas, acting by and through the Texas Parks and Wildlife Department, to commence and complete certain public works described as:

Project No. 126476 – Bunkhouse Complex Replacement and Project No. 126828C – Additive Alternate: Visitor Center Landscaping, Chaparral Wildlife Management Area, Dimmit County, Texas.

NOW THEREFORE, the conditions of this obligation are such that, if the PRINCIPAL shall faithfully perform the contract in accordance with the plans, specifications, and contract documents, and as provided in TITLE 10, TEXAS GOVERNMENT CODE, CHAPTER 2253 shall fully indemnify and save harmless the State of Texas from all cost and damage which the State of Texas may suffer by reason of the PRINCIPAL’S default or failure to do so and shall fully reimburse and repay the State of Texas all outlay and expense which the State of Texas may incur in making good any such default, then obligation shall be null and void, otherwise it shall remain in full force and effect.

Provided further, that if any legal action be filed upon this bond, venue shall lie in Travis County, Texas and that the said surety(ies) for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder, or the Specifications accompanying the same, shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition, to the items of the Contract or to the work or to the Specifications.

In the event PRINCIPAL is in default under the contract as defined herein, SURETY(IES) will within fifteen (15) days of determination of such default take over and assume completion of said contract and become entitled to the payment of the balance of the contract price.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their several seals this _____ day of ____________________, 20___, the name and corporation seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

PRINCIPAL                                           SURETY

BY_________________________________________        BY_________________________________________
TEXAS PARKS AND WILDLIFE

PAYMENT BOND

STATE OF TEXAS

COUNTY OF ____________________________

KNOW ALL MEN BY THESE PRESENTS:

That we, ____________________________, as PRINCIPAL,

and ____________________________, as SURETY(IES),

are hereby held and firmly bound unto the State of Texas in the penal sum of: ____________________________ Dollars ($__________) for the payment, whereof, the said PRINCIPAL and SURETY(IES) bind themselves, their heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents.

The conditions of this obligation are such that whereas the PRINCIPAL entered into a certain contract dated _________, 20____, hereto attached, and made a part hereof, with the State of Texas, acting by and through the Texas Parks and Wildlife Department, to commence and complete certain public works described as:

Project No. 126476 – Bunkhouse Complex Replacement and Project No. 126828C – Additive Alternate: Visitor Center Landscaping, Chaparral Wildlife Management Area, Dimmit County, Texas

NOW THEREFORE, the conditions of this obligation are such that, if the PRINCIPAL shall promptly make payment to all claimants as defined in TITLE 10, TEXAS GOVERNMENT CODE, CHAPTER 2253, as amended, supplying labor and materials in the prosecution of the work provided for in said contract and any and all duly authorized changes to said contract that may hereafter be made, notice of such changes to the SURETY(IES) being hereby waived, then, this obligation shall be null and void, otherwise it shall remain in full force and effect.

This bond is made and entered into solely for the protection of all claimants supplying labor and materials in the prosecution of the work provided for in said contract, and all such claimants shall have a direct right to action under the bond as provided in TITLE 10, TEXAS GOVERNMENT CODE, CHAPTER 2253, as amended.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their several seals this ______ day of _______________________, 20____, the name and corporation seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

PRINCIPAL

BY ____________________________

SURETY

BY ____________________________
STATE OF TEXAS

COUNTY OF __________

BEFORE ME THE UNDERSIGNED AUTHORITY, on this day personally appeared _______ who being

duly sworn, on oath, says that he/she is a duly authorized representative of ____________ , CONTRACTOR, and all terms of the Contract for the completion of certain public works described as Project No. 126476 – Bunkhouse Complex Replacement and Project No. 126828C – Additive Alternate: Visitor Center Landscaping, Chaparral Wildlife Management Area, Dimmit County, Texas.

have been satisfactorily completed to the extent indicated on the attached voucher and that ALL sums of money due for payrolls, bills for material and equipment, and other indebtedness connected with the Work for which OWNER or its property might in any way be responsible, to the best of his/her knowledge and belief have been paid or will be paid or otherwise satisfied within ten days after receipt of the requested payment from the OWNER, or within the period of time required by Title 10, Texas Government Code, Section 2251.022.

Affiant agrees to indemnify and hold Owner harmless from any liens, debts or obligations which arise as a result of labor or materials provided by or through Affiant to the project. Affiant further agrees to indemnify and hold harmless all real property on which the improvements were constructed and all interests in such property, including leasehold interests, from any liens, debts, or obligations arising from any labor or materials provided by or through Affiant to the project.

Payments to subcontractors for labor and/or materials which are pending or disputed as of the date hereof are:

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<th>Individual or Company Name</th>
<th>Mailing Address</th>
<th>Amount Owed</th>
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Instructions: Affidavit must be signed by an individual owner, a partner in a partnership, or by a person authorized by bylaws or Board of Directors to sign for a corporation. If Contractor is a joint venture or partnership of individuals, either may sign, but if a joint venture in which a corporation is a party, separate affidavits must be executed by each corporation and by each individual owner or partnership.

Sworn to and subscribed before me this _____ day of _________ 20__.  

(SEAL)

Notary Public in and for _____________________________ County, Texas
TEXAS PARKS AND WILDLIFE

CONTRACTOR'S FINAL PAYMENT AFFIDAVIT

STATE OF TEXAS

COUNTY OF ____________

BEFORE ME THE Undersigned Authority, on this day personally appeared

who being duly sworn, on oath, says that he/she is a duly authorized representative of

________________________

CONTRACTOR,

and that all terms of the Contract for the completion of certain public works described as

Project No. 126476 – Bunkhouse Complex Replacement and Project No. 126828C – Additive Alternate: Visitor Center Landscaping, Chaparral Wildlife Management Area, Dimmit County, Texas.

have been satisfactorily completed and that ALL sums of money for payrolls, bills for material and equipment, and other indebtedness connected with the Work for which Owner or its property might in any way be responsible, to the best of his/her knowledge and belief, have been paid or will be paid or otherwise satisfied within ten days after receipt of final payment from the Owner, or within the period of time required by Title 10, Texas Government Code, Section 2251.022. Payments not made in full at the date of this affidavit are listed below.

Affiant hereby waives all claims against the Owner. (List any exceptions):

Affiant agrees to indemnify and hold Owner harmless from any liens, debts or obligations which arise as a result of labor or materials provided by or through Affiant to the project. Affiant further agrees to indemnify and hold harmless all real property on which the improvements were constructed and all interests in such property, including leasehold interests, from any liens, debts, or obligations arising from any labor or materials provided by or through Affiant to the project.

Final payments to subcontractors for labor and/or materials which are pending or disputed as of the date hereof are:

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INSTRUCTIONS: Affidavit must be signed by an individual owner, or partner in a partnership, or by a person authorized by bylaws or Board of Directors to sign for a corporation. If Contractor is a joint venture or partnership of individuals, either may sign, but if a joint venture in which a corporation is a party, separate affidavits must be executed by each corporation and by each individual owner or partnership. In the event subcontractors, laborers, or materialmen have not been paid in full, Contractor shall list hereon the amount owed and the name and address of each subcontractor, laborer, or materialman to whom such payment is owed. Add additional pages if required.

________________________

Signature

________________________

Title

Sworn to and subscribed before me this _____ day of ____________ 20__

(SEAL)

________________________

Notary Public in and for

________________________ County, Texas
TEXAS PARKS AND WILDLIFE

CONSENT OF SURETY COMPANY TO FINAL PAYMENT

PROJECT NUMBERS 126476 and 126828C
126476-Bunkhouse Complex Replacement and 126828C-Additive Alternate:

TITLE OF PROJECTS Visitor Center Landscaping

PROJECT LOCATION Chaparral WMA

OWNER: Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

CONTRACTOR:

(Name)

(Address)

(City, State, Zip Code)

SURETY COMPANY:

(Name)

(Address)

(City, State, Zip Code)

on bond of ____________________________, Contractor, hereby approves of the final payment by Owner to Contractor on the above Contract, and agrees that final payment to the Contractor shall not relieve Surety Company of any of its obligations to Owner as set forth in said Surety Company's bond.

IN WITNESS WHEREOF, Surety Company has hereunto set its hand this _____ day of ______________, 20__.

SURETY COMPANY:

By: ____________________________

(Signature)

(Printed Name)

(Title)
NON-USE OF ASBESTOS CONTAINING MATERIALS AFFIDAVIT - CONTRACTOR

STATE OF TEXAS §

COUNTY OF ______________ §

Project Names: Chaparral Wildlife Management Area: 126476 - Bunkhouse Complex Replacement, and 126828C – Additive Alternate: Visitor Center Landscaping

Project Numbers: 126476- Bunkhouse and 126828C – Add. Alt.

By the signature below, the signatory for the Contractor certifies that neither he nor the firm, corporation, partnership or institution represented by the signatory or anyone acting for the firm providing Construction Services for this project, including Subcontractors, have utilized materials, procedures or processes that knowingly or intentionally contain asbestos materials.

Signature: __________________________________________________________________________

Printed Name: _______________________________________________________________________

Title: ______________________________________________________________________________

Company: __________________________________________________________________________

Date: ______________________________________________________________________________

State of Texas
County of ______________

Sworn to and subscribed before me on the ______ day of __________, 20____ by ______________________ (name/signature of signer) the undersigned authority on behalf of said Contractor.

(Personalized Seal)

Notary Public’s Signature

My commission expires: _____

Revised August 2007
CONSTRUCTION DOCUMENTS
DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01000 – SPECIAL CONDITIONS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including Uniform General and Supplementary General Conditions and other Division 1 specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

Furnish all labor, materials, tools, equipment and incidentals necessary for performance of all work associated with Project Number 126476, Bunkhouse Complex Replacement and Project Number 126828C, Additive Alternate: Visitor Center Landscaping, Chaparral Wildlife Management Area, Dimmit County, Texas, such work being as more particularly described in these Special Conditions, the drawings, and elsewhere in these Invitation for Bids and Contract Documents.

1.03 INQUIRIES:

All inquiries regarding the Invitation for Bids and Contract Documents, including any apparent discrepancies thereto and administration of the contract, shall be directed to the Texas Parks and Wildlife Department, Infrastructure Division, 4200 Smith School Road, Austin, Texas 78744, Gisela Alanis, Contract Manager, 512/389-4480 or gisela.alanis@tpwd.texas.gov.

1.04 EXAMINATION OF SITE:

Bidders should visit the site and be thoroughly familiar with job conditions such as the location, accessibility, and general character of the site and/or building prior to submitting a bid. Visits shall be scheduled with Chuck Blue, Construction Manager, at 512/627-4337. Failure to give proper consideration to site conditions when preparing bids will not constitute grounds for additional compensation. (See UGC, Article 3).

1.05 INTENT OF THE CONTRACT DOCUMENTS: (See also UGC, Article 6)

A. The intent of the Contract Documents is to include all of the work for the contract price and within the contract time. Contract Documents are to be considered as cooperative. All work not specified and/or not shown on the drawings but which is necessary for the completion and/or functioning and operation of the project, shall be understood and implied as part of the contract to be performed by the Contractor for the contract price. Such work shall be executed by the Contractor in the same manner and with the same character of material as other portions of the contract without extra compensation.

B. It is the intention of the Contract Documents to call for finished work, tested, and ready for operation.

1. Any apparatus, material or work described in the Contract Documents and any incidental accessories necessary to make the work complete in all respects and ready for operation (even though not particularly specified) shall be furnished, delivered, and installed by the Contractor without additional expense to the Owner.
2. Minor details not usually shown or specified but necessary for proper installation and operation are included in the work just as if herein specified or shown.

C. All work shall be performed and furnished by the Contractor in accordance with accepted construction industry practices.

D. A duplication of work is not intended by the Contract Documents and any duplication shall not become a basis for extra cost to the Owner.

E. Explanatory notes on the drawings shall take precedence over conflicting drawn-out indications. Figured dimensions on drawings shall take precedence over scale measurements. Where figures are lacking, scale measurements may be followed, but in all cases the measurements are to be checked from the work in place and those measured dimensions taken at the site shall take precedence over scale dimensions in drawings.

F. Upon discovery by Contractor of errors, omissions or inconsistencies in the Contract Documents, Contractor shall promptly report them to the Owner and shall wait for instruction from Owner prior to proceeding with the work.

G. In the event of conflict between the Special Conditions, the Supplementary Conditions, and the Uniform General Conditions, the following priority order shall apply in resolving such conflicts: Special Conditions, Supplementary Conditions, and then Uniform General Conditions.

H. The drawings consist of all project drawings and any drawings issued by addenda.

1.06 ADDENDA:

Any addenda issued in writing by the Owner during the period of bidding shall be included in the bid and Bidder's receipt of addenda shall be acknowledged in the bid form. Such addenda shall become a part of the contract and shall modify the Contract Documents accordingly. Oral changes in the work made during the period of bidding will not be binding. **BIDDER'S FAILURE TO ACKNOWLEDGE RECEIPT OF ADDENDA MAY RESULT IN REJECTION OF BID.**

1.07 PERMITS AND LAWS (See also UGC Article 3):

Contractor shall comply with all laws, ordinances, statutes, rules and regulations applicable to the project, including but not limited to those pertaining to the collection, transportation and disposal of trash and refuse and shall obtain such permits, licenses or other authorizations as may be required.

If applicable governmental laws, rules, regulations or ordinances conflict with the Contract Documents, then such laws, rules, regulations, or ordinances shall govern instead of the Contract Documents, except in such cases where the Contract Documents exceed them in quality of materials or labor, then the Contract Documents shall be followed.

1.08 PRECONSTRUCTION CONFERENCE AND PROGRESS MEETINGS: (See also UGC Article 3)

After issuance of the Notice to Proceed letter, approval of Pre-Construction (PR) submittals and prior to start of work, a conference between the Owner and the Contractor will be held to discuss provisions of the Contract Documents and to coordinate the work effort. Attendance by Contractor and Contractor's superintendent(s) is required, along with major trades if requested by Owner. Construction progress
meetings may be called at any time by the Owner’s Project Manager, On-Site ODR, or the Contractor to review job progress or problems.

1.09 SUBMITTALS:

A. GENERAL (See also UGC Article 8):

1. A TPWD standard Submittal Cover Sheet must accompany each numbered submittal set. One Submittal per Submittal Cover Sheet.

2. The number of copies of submittals required for each item shall be not less than one (1) electronic copy, unless specified otherwise, for Owner’s use, plus the number of additional copies that the Contractor desires for his own use.

3. The Contractor must double-check and sign all submittals before forwarding them to the Owner for review and action.

4. The Architect/Engineer and the Owner will review the submittal data. If there are no exceptions taken to the submittal, the original and three copies will be retained by the Owner. All remaining copies will be returned to the Contractor. The Contractor must keep one copy at the jobsite at all times.

5. If further action is required by the Contractor, Owner will retain three copies of the submittal data for the Owner’s use and return all remaining copies to the Contractor.

6. Any and all costs, direct or indirect, incurred by Owner in reviewing submittals in excess of two (2) times will be charged to the Contractor and deducted from the total price for the work.

7. Owner’s approval of shop drawings and/or any aspects of the work shall not act to transfer Contractor’s responsibility for, nor relieve Contractor from the performance of any of Contractor’s duties set forth in the contract documents.

B. PRE-CONSTRUCTION SUBMITTALS: The following PR Submittals shall be submitted by the Contractor for the Owner’s review and approval. Contractor’s failure to obtain approval of PR submittals will not constitute grounds for additional time. Owner will provide more specific clarification regarding the requirements for each PR Submittal.

1. Submittal PR-1 – To be submitted by the Contractor for the Owner’s review and approval within twenty-one (21) calendar days from receipt of Notice of Selection. Owner’s Approval of PR 1 submittals is a prerequisite to the scheduling of the pre-construction meeting and start of construction activities. Contractor’s failure to obtain approval of PR submittals will not constitute grounds for additional time (See also UGC Article 3)

   a. Contractor’s Superintendent: List of name and qualifications of the person designated as project superintendent.

   b. Subcontractors/Materials Suppliers: List of all subcontractors and major material/equipment suppliers that Contractor and Contractor’s major subcontractors propose to use. This list shall include correct names, mailing addresses and phone numbers.

   c. Contractor’s Authorized Representatives: List of names and titles of Contractor’s representatives authorized to sign contractual documents and construction vouchers.

   d. Licensed Craftspersons: List of names, qualifications and licenses of all licensed crafts required by the contract documents.
2. **Submittal PR-2 – To be submitted by the Contractor for the Owner’s review and approval within twenty-one (21) calendar days from receipt of Notice of Selection. Owner’s Approval of PR 2 submittals is required prior to requesting payment.** Contractor’s failure to obtain approval of PR submittals will not constitute grounds for additional time (See also UGC Article 3)

   a. **Schedule of Values**, itemizing material and labor for each classification of work. (See also UGC, Article 10)
      1. Owner will provide forms entitled “Schedule of Values” for the Contractor’s use in preparing the breakdown. After contract award, the Owner will also provide further clarification including an example.

      2. Itemization of material and labor costs is required so the Owner may make progress payments on materials delivered. For each bid item or classification of work to be listed in the “Type of Work” column on the Schedule of Values, the Contractor shall multiply the unit bid price by the estimated quantity for each bid item to arrive at the “Contract Cost” for each such bid item. Contractor shall separately itemize material and labor costs for each such bid item in the “Type of Work” column.

   b. **Work Progress Schedule** (in duplicate) of Contractor’s Proposed Construction Schedule for work tasks in relation to the entire project. (See also UGC, Article 9) Owner will provide a schedule bar chart form to aid the Contractor in preparing a schedule. The Contractor shall follow this format and must indicate all work tasks as well as differentiate critical path work tasks from non-critical path tasks showing the beginning and ending dates for each critical and non-critical path work task.

   c. **Submittal Register**: Submittal Register shall be organized by specification section, listing all items to be furnished for review and approval by the A/E and the Owner, including anticipated sequence and submittal dates. (Refer to Article 8, specifically 8.3.1.3, of the Uniform General Conditions.)

C. **MATERIAL SUBMITTALS**: To be submitted to Owner prior to the installation of any materials. It is the Contractor’s responsibility to incorporate lead time required for review, resubmittal, ordering, manufacturing, fabrication and delivery. Contractor is responsible if a delay in lead time planning affects the critical path.

1. Contractor shall submit manufacturer’s information on all materials and equipment, regardless of whether substitutions are being requested.

2. Substitution requests must be submitted early enough to allow time for evaluation by the Owner and for re-submittal, if required. Contractor’s substitution requests shall address the following factors which will be considered in evaluating the proposed substitution:

   a. Whether the evaluation and acceptance of the proposed substitution will prejudice the Contractor’s achievement of Substantial Completion on time;

   b. Whether acceptance of the substitution for use in the work will require a change in any of the Contract Documents to adapt the design to the proposed substitution.
c. Whether incorporation or use of the substitution in connection with the work is subject to payment of any license fee or royalty.

d. Whether all variations of the proposed substitution from the items originally specified are identified.

e. Whether available maintenance, repair, and replacement service are indicated. The manufacturer shall have a local service agency (within 50 miles of the site) which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.

f. Whether an itemized estimate is included of all costs that will result directly or indirectly from acceptance of such substitution, including cost of redesign and claims of other contractors affected by the resulting change.

g. Whether the proposed substitute item meets or exceeds the experience and/or equivalency requirements listed in the appropriate technical specifications.

3. No materials shall be ordered or installed until submittals for such materials have been received and acted upon by the Owner.

1.10 QUALITY ASSURANCE (See also UGC Article 8):

A. The Owner’s On-Site ODR will periodically inspect and observe the construction progress, procedures, and materials of the Contractor. The Contractor shall coordinate all efforts with the On-Site ODR, offer full cooperation to facilitate such observations, and shall be responsive to questions from such On-Site ODR regarding methods, equipment, materials, and intentions in pursuing the work or any particular thereof. Such observation by the Owner shall not be construed as construction supervision nor indication of approval of the manner or location in which the work is being performed as being a safe practice or place.

B. The On-Site ODR’s responsibilities include but are not limited to:

1. Providing quality assurance for the Owner.
2. Submitting written reports concerning the current status of the work.
3. Reviewing, and verifying to the Owner the amounts shown on the Contractor’s monthly Construction Voucher.
4. Requesting and receiving payroll and materials invoice amounts from the Contractor.
5. Witnessing testing and confirming in writing to the Owner the results of all tests.

C. Inspections, Notification, and Scheduling:

1. The Contractor shall notify the On-Site ODR when work is ready for inspection or testing. The Contractor shall give such notifications sufficiently in advance of other work to prevent delays. A minimum of five (5) working days advance notice is required, and Contractor shall include in his work schedule such notice periods for inspections and/or testing.
2. Tests cannot be conducted and work cannot be covered-up until the On-Site ODR observes and authorizes continuation of work. The Contractor shall bear all costs for re-tests and for removal and replacement of construction resulting from unauthorized continuation.
3. Should ODR fail to make the necessary inspection within the agreed period, Contractor may proceed with cover-up Work after making every reasonable effort to contact the ODR and
after documenting the Work, but is not relieved of responsibility for Work to comply with requirements of the Contract Documents.

D. All permanent utilities shall be connected before final tests are conducted for equipment and systems. Final operational tests shall be conducted prior to project acceptance by the Owner. The Contractor shall provide the materials, energy, equipment and personnel to conduct the tests required in the contract.

E. Contractor’s failure to provide notification to Owner of inspection or testing requirements shall void any certifications of testing and shall require the Contractor to re-test at the Owner’s request. All expenses for re-testing shall be paid by the Contractor.

F. The Owner (including Owner’s On-Site ODR) may reject work not conforming to the contract documents. If the Owner rejects work and/or materials incorporated into the project, Contractor shall bear all expenses associated with testing to prove compliance with the Contract Documents, including but not limited to engineering/architectural expenses associated with such testing. Any and all such expenses that are paid directly by Owner shall be deducted or withheld from subsequent payment(s) to the Contractor.

1.11 INVOICES/PAY REQUESTS AND CHANGE ORDERS:

A. All work items for which Contractor requests payment shall reflect the project number with which those work items are associated. Change Order pricing for items that are already priced in the contractor’s bid shall be limited to such price(s) set forth in such bid and shall not be entitled to additional mark-up for overhead and profit.

B. Contractor is required to submit an original Progress Assessment Report (PAR) to TPWD HUB Administration no later than the 5th day of the month. Contractor shall submit a copy of the current month’s PAR to the Owner with the application for payment (construction voucher). The PAR is the monthly compliance report verifying Contractor’s compliance with the HUB Subcontracting Plan (HSP) including the expenditures the Contractor has made to Subcontractors during the prior month.

1.12 CONTRACT COMPLETION: (See also UGC, Article 9)

A. Contract Period: This contract must be completed within the specified number of days commencing on the date cited in the Notice to Proceed letter.

1. Unless specifically stated as “working day,” the term “day” or “calendar day” shall mean every day of the calendar year. Along with the Work Progress Schedule, the Contractor shall submit his schedule for normal working days.

2. Claims for extension of time shall be made in accordance with the provisions of Article 9 of the Uniform General Conditions.

B. Liquidated Damages: The Owner has determined that the completion of the work in this contract is critical to the proper operation of the facility, and the Contractor’s failure to complete the work within such time will cause damage to the Owner. Since exact damages are difficult to determine or forecast, the sum of $339.22 per calendar day is hereby established by the parties as a reasonable estimate of just compensation to the Owner for the failure of the Contractor to complete the work by the time set forth in the contract or authorized extension thereto. Said sum will be deducted from the money due or to become due to the Contractor, not as a penalty but as
liquidated damages from added expense, including administrative and inspection costs, for each and every calendar day the work or any portion thereof remains incomplete after the expiration of the time limit set in the contract or authorized extension.

C. Charges for liquidated damages will begin accumulating on the first calendar day following the final contract completion date and continue until the date of final acceptance as established by the Owner. Final acceptance will not be issued until all punch list items have been completed.

1.13 CONTRACT CLOSE-OUT: (See also UGC Article 12)

A. Notification: The Contractor shall provide Owner 15-days' written notice requesting final inspection.

B. Final Submittals: At the time of the Contractor’s request for final inspection, Contractor shall provide to Owner the following material (in addition to final payment documents also required by UGC Article 12 and set forth below in subsection D) which the Contractor shall have accumulated and retained during the course of the project:

1. Two (2) hard copies and two (2) electronic sets of all project submittals and all equipment and material warranties/guarantees as provided by all appropriate suppliers or manufacturers.

2. One set of one (1) hard copy and one (1) electronic set of “as-built documents” showing all revisions to the original Contract Documents. Drawings shall also show routing of underground outside utilities and conduits with actual dimensions from buildings or other known landmarks.

3. Any and all other documents, keys, manuals, etc. required by the Contract Documents.

C. Clean-up: At completion of the job, the Contractor shall remove all waste products, dust, dirt, debris, packaging, trash, fingerprints, grease containers, and other deleterious materials and marks from the site. Refer to individual specification sections for special cleaning required by that section. Contractor is expected to leave the project in spotless, “like new” condition.

D. Final Payment: Submit final construction voucher, Consent of Surety Company to Final Payment, and the Contractor’s Final Payment Affidavit.

1.14 CONTRACTOR’S RESPONSIBILITY DURING THE WARRANTY PERIOD (See also UGC, Article 13):

A. Warranties: The Contractor shall guarantee all work against defects in materials, equipment, or workmanship for a period of one year from the date of final acceptance. The Contractor shall also provide any additional warranties and guarantees of work items and components as hereinafter specified.

B. Service: All necessary service to each electrical and mechanical system and other work requiring specialized training shall be furnished by the Contractor at no cost to the Owner for a period running concurrently with the one-year warranty period specified above. Such service shall not include repair of damage due to storm, vandalism or other factors entirely beyond the control of the Contractor.

C. The Contractor will receive no additional compensation for work performed during the one-year warranty period.
1.15. REFERENCES AND STANDARDS:

All contractors, including sub-contractors shall ensure all personnel follow the adopted Standardized Building Codes in all design and construction work.

1.16 NON-APPROPRIATION OF FUNDS:

Any contract resulting from this solicitation is subject to termination or cancellation, without penalty to TPWD, either in whole or in part, subject to the availability of state funds. TPWD is a state agency whose authority and appropriations are subject to actions of the Texas Legislature. If TPWD becomes subject to a legislative change, revocation of statutory authority, or lack of appropriated funds which would render TPWD’s or contractor’s delivery or performance under the contract impossible or unnecessary, the contract will be terminated or cancelled and be deemed null and void. In the event of a termination or cancellation under this Section, TPWD will not be liable to contractor for any damages, which are caused or associated with such termination, or cancellation and TPWD will not be required to give prior notice.

1.17 ANTIQUITIES:

Contractor shall take precaution to avoid disturbing primitive records and antiquities of archaeological, paleontological or historical significance. No objects of this nature shall be disturbed without written permission of Owner and the Texas Historical Commission. When such objects are uncovered unexpectedly, the Contractor shall stop all Work in close proximity and notify the ODR and the Texas Historical Commission of their presence and shall not disturb them until written permission and permit to do so is granted. All primitive rights and antiquities, as defined in Chapter 191, Texas Natural Resource Code, discovered on the Owner’s property shall remain property of State of Texas, the Texas Historical Commission. It is determined by Owner, in consultation with the Texas Historical Commission that exploration or excavation of primitive records or antiquities on Project Site is necessary to avoid loss, Contractor shall cooperate in salvage work attendant to preservation.

1.18 PROPRIETARY OR CONFIDENTIAL INFORMATION; TEXAS PUBLIC INFORMATION ACT:

A. Any proprietary, trade secret or otherwise confidential information Bidder includes in its Bid must be clearly labeled as proprietary or confidential information, and Bidder must identify the specific exception to disclosure in the Public Information Act (PIA). Merely making a blanket claim the entire Bid is protected from disclosure because it contains some proprietary information is not acceptable and shall make the entire Bid subject to release under the PIA. In order for the Owner to initial the process of seeking an Attorney General opinion on the release of proprietary or confidential information, the specific provisions of the Bid that are considered by the Bidder to be proprietary or confidential must be clearly labeled as described herein. Any information which is not clearly identified as proprietary or confidential shall be deemed to be subject to disclosure pursuant to the PIA.

B. Information the Bidder provides to the Owner in response to this solicitation will be considered public and subject to disclosure under the Texas Public Information Act.

C. Contractor is required to make any information created or exchanged with the state pursuant to this contract, and not otherwise excepted from disclosure under the Texas Public Information Act, available in a format that is accessible by the public at no charge to the state. Contractor will make sure information not excepted from disclosure available in an electronic format that is accessible to the public unless Contractor receives written approval from Owner to provide information in a different format, and such approval becomes a part of this Contract.
1.19 **RIGHT TO AUDIT/RECORDS RETENTION:**

Contractor understands that acceptance of funds under this contract acts as acceptance of the authority of the State Auditor’s Office, TPWD or any successor agency, to conduct an audit or investigation in connection with those funds. Contractor further agrees to cooperate fully with the above parties in the conduct of the audit or investigation, including providing all records requested. Contractor shall ensure that this paragraph concerning the State’s authority to audit funds received indirectly by subcontractors through Contractor and the requirement to cooperate is included in any subcontract it awards. Contractor shall maintain and retain supporting fiscal and any other documents relevant to showing that any payments under this Contract funds were expended in accordance with the laws and regulations of the State of Texas, including but not limited to, requirements of the Comptroller of the State of Texas and the State Auditor. Contractor shall maintain all such documents and other records relating to this Contract and the State’s property for a period of seven (7) years after the date of submission of the final invoices or until a resolution of all billing questions, whichever is later. Contractor shall make available at reasonable times and upon reasonable notice, and for reasonable periods, all documents and other information related to the work of this Contract. Contractor and the subcontractors shall provide the State Auditor with any information that the State Auditor deems relevant to any investigation or audit. Contractor must retain all work and other supporting documents pertaining to this Contract, for purposes of inspecting, monitoring, auditing, or evaluating by TPWD and any authorized agency of the State of Texas, including an investigation or audit by the State Auditor. Contractor shall cooperate with any authorized agents of the State of Texas and shall provide them with prompt access to all of such State’s work as requested. Contractor’s failure to comply with this Section shall constitute a material breach of this Contract and shall authorize TPWD and the State of Texas to immediately assess appropriate damages for such failure.

1.20 **IMMIGRATION REFORM:**

The Contractor represents and warrants that it shall comply with the requirements of the Immigration Reform and Control Act of 1986 and 1990 regarding employment verification and retention of verification forms for any individuals hired on or after November 6, 1986, who will perform any labor or services under the Contract and the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA) enacted on September 30, 1996.

1.21 **CIVIL RIGHTS:**

The Contractor agrees that no person shall, on the ground of race, color, religion, sex, national origin, age, disability, political affiliation, or religious belief, be excluded from the participation in, be denied the benefits of, be subjected to discrimination under, or be denied employment in the administration of, or in connection with, any program or activity funded in whole or in part with funds available under this Contract. The Contract shall comply with Executive Order 11246, “Equal Employment Opportunity,” as amended by Executive Order 11375, “Amending Executive Order 11246 relating to Equal Employment Opportunity,” and as supplemented by regulations at 41 C.F.R. Part 60, “Office of Federal Contract Compliance Programs, Equal Employment Opportunity Department of Labor.”

1.22 **FEDERAL, STATE AND LOCAL REQUIREMENTS:**

Contractor shall demonstrate on-site compliance with the Federal Tax Reform Act of 1986, Section 1706, amending Section 530 of the Revenue Act of 1978, dealing with issuance of Form W-2’s to common law employees. Contractor is responsible for both federal and State unemployment insurance coverage and standard Worker’s Compensation insurance coverage. Contractor shall comply with all federal and State tax laws and withholding requirements. The State of Texas shall not be liable to Contractor or its
employees for any Unemployment or Worker’s Compensation coverage or federal or State withholding requirements. **Contractor shall indemnify the State of Texas and shall pay all costs, penalties or losses resulting from Contractor’s omission or breach of this Section.**

1.23 **SEVERABILITY CLAUSE:**

If any provision of this Contract is construed to be illegal or invalid, such construction will not affect the legality or validity of any of its other provisions. The illegal or invalid provision will be deemed severable and stricken from the contract as if it had never been incorporated herein, but all other provisions will remain in full force and effect.

1.24 **NO WAIVER:**

Nothing in this Contract shall be construed as a waiver of the state’s sovereign immunity. This Contract shall not constitute or be construed as a waiver of any of the privileges, rights, defenses, remedies or immunities available to the State of Texas. The failure to enforce or any delay in the enforcement of any privileges, rights, defenses, remedies or immunities available to the State of Texas under this Contract or under applicable law shall not constitute a waiver of such privileges, rights, defenses, remedies or immunities or be considered as a basis for estoppel. The Owner does not waive any privileges, rights, defenses or immunities available to the Owner by entering into this Contract or by its conduct prior to or subsequent to entering into this Contract.

1.25 **DECEPTIVE TRADE PRACTICES; UNFAIR BUSINESS PRACTICES:**

Contractor represents and warrants that it has not been the subject of allegations of Deceptive Trade Practices violations under Tex. Bus. & Com Code, Chapter 17 or allegations of any unfair business practice in any administrative hearing or court suit and that Contractor has not been found to be liable for such practices in such proceedings. Contractor certifies that it has no officers who have served as officers of other entities who have been the subject allegations of Deceptive Trade Practices violations or allegations of any unfair business practices in an administrative hearing or court suit, and that such officers have not been found to be liable for such practices in such proceedings.

1.26 **FELONY CRIMINAL CONVICTIONS:**

Contractor represents and warrants that Contractor has not and Contractor’s employees have not been convicted of a felony criminal offense or that if such a conviction has occurred, Contractor has fully advised the Owner as to the facts and circumstances surrounding the conviction.

1.27 **ASSIGNMENTS:**

The Contractor shall not assign its rights under the Contract or delegate the performance of its duties under the Contract without prior written approval from the Owner.

1.28 **INDEPENDENT CONTRACTOR:**

The Contractor shall not render the Contractor to an employee, officer or agent of the Owner for any purpose. The Contractor is and shall remain an independent contractor in relationship to the Owner. The Owner shall not be responsible for withholding taxes from payments made under the Contract. The Contractor shall have no claim against the Owner for vacation pay, sick leave, retirement benefits, social security, worker’s compensation, health or disability benefits, unemployment insurance benefits, or employee benefits of any kind.
1.29 PATENTS, TRADEMARKS OR COPYRIGHTS:

Contract agrees to defend and indemnify the Owner and State from claims involving infringement or violation of patents, trademarks, copyrights, trade secrets, or other proprietary rights, arising out of the Owner’s or the State’s use of any good or service provided by the Contractor as a result of this solicitation.

1.30 FORCE MAJEURE:

The Owner may grant relief from performance of contract if the Contractor is prevented from performance by an act of war, order of legal authority, act of God, or other unavoidable cause not attributable to the fault or negligence of Contractor. The burden of proof for the need of such relief shall rest upon the Contractor. To obtain release based on force majeure, the Contractor shall file a written request with the Owner.

1.31 U.S. DEPARTMENT OF HOMELAND SECURITY’S E-VERIFY SYSTEM:

By entering into this Contract, the Contractor certifies and ensures that it utilizes and will continue to utilize, for the term of this Contract, the U.S. Department of Homeland Security’s E-Verify system to determine the eligibility of:

A. All persons employed to perform duties within Texas, during the term of the Contract; and
B. All persons (including subcontractors) assigned by the Respondent to perform work pursuant to the Contract, within the United States of America.

The Contractor shall provide, upon request of Texas Parks and Wildlife Department, an electronic or hardcopy screenshot of the confirmation or tentative non-confirmation screen containing the E-Verify case verification number for attachment to the Form I-9 for the three most recent hires that match the criteria above, by the Contractor, and Contractor’s subcontractors, as proof that this provision is being followed.

If this certification is falsely made, the Contract may be immediately terminated, at the discretion of the state and at no fault to the state, with no prior notification. The Contractor shall also be responsible for the costs of any re-solicitation that the state must undertake to replace the terminated Contract.

1.32 MINIMUM EXPERIENCE REQUIREMENTS:

CONTRACTOR MUST SHOW EVIDENCE OF THREE (3) SUCCESSFUL CONSTRUCTION PROJECTS SIMILAR TO THIS PROJECT (AS JUDGED BY OWNER) THAT OCCURRED WITHIN THE PAST FIVE (5) YEARS, TO BE ELIGIBLE FOR AWARD OF THIS CONTRACT. THIS EXPERIENCE IS MEASURED BACKWARDS FROM THE ISSUE DATE OF THIS SOLICITATION. EXPERIENCE TO INCLUDE RELEVANT VARIANT REFRIGERANT FLOW (VRF) WITH HEAT RECOVERY.

1.33 SPECIAL INSURANCE REQUIREMENTS: (See also UGC, Article 5)

**Umbrella Liability Insurance:** Amount of Insurance. Coverage shall be provided with a limit of not less than $5,000,000. The Contractor shall maintain such insurance in identical coverage, form and amount, including required endorsements, for at least two (2) years following Date of Substantial Completion of the Work.
to be performed under this Contract. The Contractor shall provide written representation to the Owner stating Work completion date.

**Builder’s Risk is a requirement of this Invitation for Bids and Contract Documents.**

1.34 **ON-SITE SEWAGE FACILITY PERMITTING REQUIREMENTS:**

This project involves the installation of an on-site sewage facility and is, therefore, subject to the requirements of Texas Administrative Code, Title 30, Chapter 285 – On-Site Sewage Facilities. Contractor shall comply with all applicable requirements contained in said Chapter, including but not limited to, Contractor’s verification of possession by Owner of Authorization to Construct prior to start of construction by Contractor and Contractor’s satisfaction of all licensing requirements for installers.

Additionally, Contractor shall provide the Project Manager with a proposed Permitting Authority inspection schedule PRIOR TO START OF CONSTRUCTION and shall request the required inspections by the Permitting Authority of the system. Contractor shall provide a minimum of five (5) working days’ notice to the Permitting Authority, the Project Engineer, and the ODR prior to required inspection(s) of the on-site sewage facility. If the facility does not pass inspection by the Permitting Authority as a result of a deficiency in the Contractor’s work, Contractor shall pay any re-inspection fees charged by the Permitting Authority and the same shall be deducted from monies otherwise due under the contract for the work.

Contractor shall install a fully functional on-site sewage facility in full compliance with all regulations of the applicable Permitting Authority resulting in the Permitting Authority’s issuance to Owner of a Notice of Approval to operate the facility by the Owner.

1.35 **DEMOLITION OF EXISTING SEWAGE FACILITIES**

All demolition activities shall comply with all applicable Permitting Authority regulations, resulting in the issuance by applicable Permitting Authority of any and all necessary documentation of approval for closure and/or removal of the facility.

1.36 **NON-DISCRIMINATION:** The undersigned is subject to Title VI of the Civil Rights Act of 1964, Section 504 or Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and offers all persons the opportunity to participate in programs or activities regardless of race, color, national origin, age, sex or disability. Further, it is agreed that no individual will be turned away or otherwise denied access to or benefit from any program or activity that is directly associated with a program on the basis of race, color, national origin, age, and sex (in educational activities) or disability. The prime contractor shall ensure that this clause is included in all subcontracts.

**PART 2 – PRODUCTS**

2.01 **CONSTRUCTION MATERIALS:**

A. **Materials:**
1. All materials shall be new and of the quality specified. Materials shall be free from defects. Where manufacturer’s names are mentioned in the specifications, it has been done in order to establish a standard of quality and construction, not to preclude the use of equal or superior materials or products of other manufacturers. However, substitutions must have Owner’s prior approval.

2. Unless otherwise indicated in the specifications or drawings, equipment and material shall be installed in accordance with the manufacturer’s recommendations and shall include such tests as manufacturer recommends.

B. Storage and Protection of Materials:

1. All materials shall be suitably stored to be protected from damage. Water-tight storage facilities of suitable size with floors raised above the ground shall be provided for all materials subject to damage from exposure to the weather. Other materials shall be stored on blocks off the ground. Materials shall be stored to permit easy access for inspection and identification. Any material which has deteriorated, become damaged or otherwise unfit for use shall not be used in the work (as judged by Owner). Upon completion of all work, or when directed, the Contractor shall remove storage facilities from the site.

2. During construction, open ends of all drains, piping and conduit, and all openings in equipment, shall be closed before leaving the work at any time so as to prevent the entrance of all foreign matter.

PART 3 – EXECUTION

3.01 CONSTRUCTION SITE AND JOB CONDITIONS:

A. The Contractor’s Superintendent shall be on site at all times that work is in progress.

B. The Contractor will be provided with designated space in the immediate vicinity of the job site for his use during construction. Unauthorized damage to any existing utilities, building facilities, structures, or plant life shall be repaired by the Contractor at no expense to the Owner. The Contractor shall not allow any unsafe or unsanitary conditions to develop as a result of Contractor’s operations.

C. The Contractor shall not allow trash or debris to accumulate on the site. At the end of the contract Contractor shall clean the entire area of any litter resulting from Contractor’s operations. The Contractor shall maintain the premises as clean and presentable as good construction practices will allow at all times.

D. Utilities: Water and electrical power are available and will be furnished by the Owner at no charge to the Contractor. However, any temporary connections, appurtenances or extensions shall be provided by the Contractor at no cost to the Owner and removed from the premises at the conclusion of the contract. Contractor shall provide cellular telephone service at all times and shall keep Owner informed of telephone number.

E. Field Office: The Owner will provide the Contractor with a site on which the Contractor may place a small, temporary office structure.

F. Temporary Toilets: The Contractor shall provide and maintain in neat, sanitary condition toilets and other necessary accommodations for employees’ use to comply with the regulations of the State Department of Health or other jurisdictions.
G. Project Identification: There shall be no project signs of any size or type allowed on the project site or surrounding Texas Parks and Wildlife Department property at any time.

H. Fire Protection: The Contractor shall take stringent precautions against fire. Open fires are not allowed unless approved in writing by Owner.

3.02 OCCUPATIONAL SAFETY AND HEALTH STANDARDS (See also UGC Article 7):

Prior to trenching below a depth of four (4) feet (if applicable), a Contractor must submit separate pay items for: (i) trench safety to be determined by the linear feet of trench excavated, and (ii) special shoring requirements, if any, to be determined by the square feet of shoring used, pursuant to Texas Government Code, Title 10, Chapter 2166, Section 2166.303. Such pay item(s), following calculation as required above, shall be quoted on the basis of a total lump sum price.

3.03 LAYOUT OF WORK AND SURVEYS:

The Contractor, at Contractor’s expense, shall be responsible for establishing base lines, and bench marks if applicable, for the limits of the project. The Contractor shall also be responsible for all measurements that may be required for the execution of the work to the location and limit marks prescribed in the specifications or on the drawings, subject to such modifications as the Owner may require to meet changed conditions or as a result of necessary modifications to the work.

3.04 SITE OPERATIONS:

During construction of this project the site will remain open to public visitation and is currently under construction for the construction of two new staff residences. It is the responsibility of the Contractor to maintain convenient access and egress to park facilities in a manner to be approved by the Owner. The Contractor shall also be responsible for public safety at the construction site. All temporary fencing, barricades, warning lights, signs, and flagmen shall be provided and maintained by Contractor as needed. The Contractor shall maintain security of construction sites.

3.05 CUTTING AND PATCHING:

A. Where indicated in the Contract Documents, this project requires cutting into existing construction for the performance of the work and requires subsequentfitting and patching to restore the existing work to original condition.

B. Utilities:
   1. Contractor shall not cut or patch utilities until all necessary approvals and coordination requirements are accomplished.
   2. Before cutting services that are to remain permanently or temporarily in service, Contractor shall provide by-pass system as necessary to maintain service.
   3. After by-pass and cutting, Contractor shall cap, valve or plug and tightly seal remaining portion of service piping or conduit to prevent entrance of moisture and foreign matter.

C. Structural Work: Contractor shall not cut or patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.

D. Inspection:
1. Before cutting, Contractor shall examine items to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, Contractor shall take corrective action before proceeding with the work.

2. Contractor shall meet at the work site with all trades involved in cutting and patching. Contractor shall review areas of potential interference and conflict between the various trades and shall coordinate layout of the work and resolve potential conflicts before proceeding with the work.

3.06. **AS-BUILT DOCUMENTS (See also UGC Article 6):**

The Contractor shall maintain on a separate set of the Contract Documents a record of all changes made during construction (As-Built Documents). The Contractor shall be responsible for keeping these records and neatly noting with colored pencil or ink all changes. Progress payments will not be made to the Contractor unless such records are maintained. Verification by the On-Site ODR of such records is solely for assurance that the records are being maintained. Such inspections shall not constitute review or approval of the as-built documents for accuracy or completeness.

3.07. **SPECIAL CONDITIONS:**

Licenses Required: Concrete, Electrical, Plumbing, Mechanical, Carpentry, Roofing, OSSF (Sanitarian), and Landscape.

**END OF SECTION**
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Texas Parks and Wildlife Department

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Texas Parks and Wildlife Department

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Texas Parks and Wildlife Department
Bunkhouse Complex Replacement, Chaparral WMA,
Project No. 126476

Texas Parks and Wildlife Department
Visitor Center Landscaping, Chaparral WMA,
Project No. 126828C
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SECCTION 00 31 31 – SOILS DISCLAIMER

DISCLAIMER OF LIABILITY

The Owner and Architect/Engineer disclaim any responsibility for the accuracy, true location and extent of the soils investigation that has been prepared by others. They further disclaim responsibility for interpretation of that data by Bidders. Report of the soils investigation is bound in this project manual for the Bidders’ convenience only and IS NOT AND SHALL NOT CONSTITUTE PART OF THE BIDDING AND CONTRACT DOCUMENTS.
Geotechnical Engineering Report

Chaparral Wildlife Management Area
64 Chaparral WMA Drive
Cotulla, Texas
October 1, 2015
Terracon Project No. 90155187

Prepared for:
TPWD Infrastructure Division
Austin, Texas

Prepared by:
Terracon Consultants, Inc.
San Antonio, Texas
October 1, 2015

TPWD Infrastructure Division
4200 Smith School Road
Austin, Texas 78744-3291

Attn: Ms. Mandy Holcomb, CTPM, CTCM

P: (512) 389-4353
F: (512) 389-4790
E: mandy.holcomb@tpwd.texas.gov

Re: Geotechnical Engineering Report
Chaparral Wildlife Management Area
64 Chaparral WMA Drive
Cotulla, Texas
Terracon Project Number: 90155187

Dear Ms. Holcomb:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. We appreciate the opportunity to be of service to you on this project and look forward to contributing to the ongoing success of this project with Materials Testing services during construction. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.
(Firm Registration: TX F3272)

Ali Waly, E.I.T.
Staff Engineer

Arindam Barkataki, P.E.
Project Engineer

AW/AB/GPS/ppv – 90155187

Copies to: Addresssee (1 via e-mail)
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Terracon Consultants, Inc. 6911 Blanco Road, San Antonio, Texas 78229
P: (210) 541-2112 F: (210) 541-2124 Texas Professional Engineers No. F-3272 terracon.com
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APPENDIX C
Exhibit C-1  General Notes
Exhibit C-2  Unified Soil Classification System
EXECUTIVE SUMMARY

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled GENERAL COMMENTS should be read for an understanding of the report limitations.

This geotechnical exploration has been performed for proposed Bunkhouse Replacement at the Chaparral Wildlife Management Area located near Cotulla, Texas. The subsurface conditions at the site were explored by drilling two soil borings to depths of approximately 5 and 25 feet below the existing grade.

Based on the information obtained from our subsurface exploration, the site can be developed for the proposed project. Pertinent geotechnical considerations include the following:

- The subsurface soils at this site generally consist of Clayey Sand (SC) underlain by Sandstone. The estimated Potential Vertical Rise (PVR) at this site is less than 1 inch.
- Groundwater was not encountered during the drilling operations.
- Grade supported foundation are considered feasible at this site.
- The subsurface conditions within the site are consistent with the characteristics of the Specific Site Class C as defined in International Building Code Site Classification (IBC) 2012.
- Both flexible and rigid pavements can be considered for the project.
1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) is pleased to submit our Geotechnical Engineering Report for the proposed Chaparral Wildlife Management Area to be located near Chaparral WMA Drive in Cotulla, Texas. This work was authorized by TPWD Purchase Order No. 469994, dated August 5, 2015 under Blanket Contract No. 443697. Our geotechnical engineering scope of work for this project included the advancement of two soil test borings to depths ranging from approximately 6 and 10 feet below existing site grades. Boring Logs along with a Site Location Plan and Boring Location Plan are included in Appendix A of this report.

The purposes of these services are to provide information and geotechnical engineering recommendations with respect to:

- subsurface soil conditions
- groundwater conditions
- earthwork
- foundation design and construction
- seismic considerations
- floor slab design and construction
- pavement design and construction

2.0 PROJECT INFORMATION

2.1 Project Description

<table>
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<th>Description</th>
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<tr>
<td>Site layout</td>
<td>Refer to Appendix A; Exhibit A-1: Site Location Plan and Exhibit A-2: Boring Location Plan.</td>
</tr>
<tr>
<td>Building</td>
<td>Two new single-story bunkhouse buildings.</td>
</tr>
<tr>
<td></td>
<td>1,775 sf with a 485 sf covered porch.</td>
</tr>
<tr>
<td></td>
<td>1,167 sf with a 340 sf covered porch.</td>
</tr>
<tr>
<td>Building Construction</td>
<td>The new bunkhouse structures will consist of wood framing. We anticipate that the structures will be supported by slab on grade or spread footings.</td>
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### 2.2 Site Location and Description

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<tr>
<td>Location</td>
<td>The project site is located near Chaparral WMA Drive, Cotulla, Texas.</td>
</tr>
<tr>
<td>Existing improvements</td>
<td>At the time of drilling activity, the project site had existing bunkhouse structures in the area.</td>
</tr>
<tr>
<td>Current ground cover</td>
<td>At the time of drilling activity, the project site surface was covered by grass and bare soil.</td>
</tr>
<tr>
<td>Existing topography</td>
<td>Based on our visual observation, the project site is relatively flat.</td>
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### 3.0 SUBSURFACE CONDITIONS

#### 3.1 Typical Profile

Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

<table>
<thead>
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<th>Approximate Depth of Stratum (feet)</th>
<th>Material Description</th>
<th>Consistency/Density</th>
</tr>
</thead>
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<tr>
<td>0 to 8</td>
<td>CLAYEY SAND (SC) (^1); reddish brown</td>
<td>Dense to Very Dense</td>
</tr>
<tr>
<td>8 to 10</td>
<td>SANDSTONE (^2); light brown</td>
<td>Hard</td>
</tr>
</tbody>
</table>

\(^1\) The CLAYEY SAND (SC) materials are granular in nature and expected to be volumetrically stable.

\(^2\) The SANDSTONE materials are expected to be volumetrically stable. B-1 was terminated at 10 feet with auger refusal

Conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs in Appendix A of this report.
3.2 Groundwater

Groundwater generally appears as either a permanent or temporary water source. Permanent groundwater is generally present year round, which may or may not be influenced by seasonal and climatic changes. Temporary groundwater is also referred to as a “perched” water source, which generally develops as a result of seasonal and climatic conditions.

The borings were drilled to their full depths using dry drilling techniques to aid in the observation of groundwater. Groundwater was not encountered during or upon completion of our field operations. However, groundwater levels are influenced by seasonal and climatic conditions which generally result in fluctuations in the elevation of the groundwater level over time. Therefore, the foundation contractor should check the groundwater conditions just before foundation excavation activities.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The following recommendations are based upon the data obtained from our field and laboratory programs, project information provided to us and on our experience with similar subsurface and site conditions.

4.1 Geotechnical Considerations

We understand that the buildings will be supported on a shallow foundation system. The desired foundation systems may be used at this site provided the building pad and foundations are designed and constructed as recommended in this report. Terracon would be pleased to discuss other foundation alternatives with you upon request.

The foundations being considered must satisfy two independent engineering criteria with respect to the subsurface conditions encountered at this site. One criterion is the foundation system must be designed with an appropriate factor of safety to reduce the possibility of a bearing capacity failure of the soils underlying the foundation when subjected to axial and lateral load conditions. The other criterion is movement of the foundation system due to compression (consolidation or shrinkage) or expansion (swell) of the underlying soils must be within tolerable limits for the structures. Expansive soil at this site is not a concern.

Based on our findings, the subsurface soils at this site generally exhibit a low expansion potential. Based on the information developed from our field and laboratory programs and on method TEX-124-E in the Texas Department of Transportation (TxDOT) Manual of Testing Procedures, we estimate that the subgrade soils at this site exhibit a Potential Vertical Rise (PVR) is less than 1 inch. The actual movements could be greater if inadequate drainage, ponded water, and/or other sources of moisture are allowed to infiltrate beneath the structure after construction.
4.1.1 Demolition Considerations
We understand that existing structures at this site will be demolished prior to construction of the Chaparral Wildlife Management Area. As a result, abandoned (or to be abandoned) underground utilities will be present within the footprint area of the planned structures. Utilities and associated backfill and granular bedding material can provide avenues for subsurface water to enter under the structure subgrade. We recommend that all abandoned utility lines be completely removed from the proposed structure areas. Abandoned pipes which remain underground should be grouted.

Any below-grade foundation or structures removal associated with demolition will likely create large subsurface voids. It is very important that all subsurface voids formed from the removal of the foundation system be backfilled completely with moisture conditioned, compacted, engineered fill as described in the 4.2 Earthwork section of this report. It is our experience that improperly backfilled excavations can cause significant settlement under and around the proposed structures.

As an alternative to compacted soil backfill, a flowable fill material may be considered. Flowable fill, or slurry, when properly designed provides a competent subgrade and can still be readily excavated if the utilities require repair or maintenance. In addition, flowable fill does not need to be placed in lifts, compacted, or tested.

4.2 Earthwork

The following presents recommendations for general site preparation, building pad preparation and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including foundations, slabs and pavements are contingent upon following the recommendations outlined in this section. Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

4.2.1 General Site Preparation
Construction operations may encounter difficulties due to the wet or soft surface soils becoming a general hindrance to equipment due to rutting and pumping of the soil surface, especially during and soon after periods of wet weather. If the subgrade cannot be adequately compacted to minimum densities as described in the Compaction Requirements section of this report, one of the following measures may be required:

- removal and replacement with select fill; or
- drying by natural means if the schedule allows.

In our experience with similar soils in this area, excavation and replacement may be an effective method to increase the supporting value of wet and weak subgrade.
Prior to construction, existing structures vegetation, loose topsoil and any otherwise unsuitable materials should be removed from the construction area. The stripped materials consisting of vegetation and organic materials should be wasted from the site, or used to revegetate landscaped areas or exposed slopes after completion of grading operations. Wet or dry material should either be removed or moisture conditioned and recompacted. After stripping and grubbing, the subgrade should be proof-rolled where possible to aid in locating loose or soft areas. Proof-rolling can be performed with a 15-ton roller or fully loaded dump truck. Soils that are observed to rut or deflect excessively (typically greater than 1-inch) under the moving load should be undercut and replaced with properly compacted on-site soils. The proof-rolling and undercutting activities should be witnessed by a representative of the geotechnical engineer and should be performed during a period of dry weather.

4.2.2 Building Pad Preparation

As previously stated, the existing PVR within the building area is less than 1 inch in its present condition. However, the upper 6 feet of the sandy material appears to have low moisture contents and loose. Therefore some building pad subgrade preparation will be required. We have provided the following subgrade preparation recommendations.

- Strip all existing vegetation, loose topsoil and any deleterious material from the building pad area. The building pad area is defined as the area that extends at least 3 feet beyond the perimeter of the building, including any movement sensitive flatwork that abuts the structure such as entryway and sidewalks.

- Excavate 2 feet of on-site soils and remove from the building pad area. Stockpile these excavated on-site soils for reuse.

- The exposed subgrade in the building area should be proofrolled with at least a 15-ton roller, or fully loaded dump truck, to evidence any weak yielding zones. A Terracon geotechnical engineer or his/her representative should be present to observe proofrolling operations.

- After proofrolling and the replacement of weak yielding zones with competent soil, scarify and moisture condition the top 6 inches of subgrade to between -2 and +3 percentage points of the optimum moisture content and compact to at least 95 percent of the maximum dry density determined in accordance with ASTM D 698.

- Place (reuse) the 2 feet stockpiled on-site soil in the pad area in loose lifts of no more than 8 inches. Each lift should be moisture conditioned between -2 and +3 percentage points of the optimum moisture content, and then compacted to at least 95 percent of the maximum dry density determined in accordance with ASTM D 698.

- If grades are to be raised further, then select fill or on-site soil moisture conditioned should be placed to achieve the Finished Building Pad Elevation (FBPE).
Recommendations for select fill are included in the “Fill Materials and Placement” section of this report. Select fill should be placed in loose lifts of no more than 8 inches, moisture conditioned to between -2 and +3 percentage points of the optimum moisture content, and compact to at least 95 percent of the maximum dry density determined in accordance with ASTM D 698.

This should result in at least 2 feet of on-site moisture conditioned and compacted soils beneath the floor slab.

4.2.3 Fill Material Requirements
Compacted structural fill should meet the following material property requirements:

<table>
<thead>
<tr>
<th>Fill Type</th>
<th>USCS Classification</th>
<th>Acceptable Location for Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granular select fill</td>
<td>Varies</td>
<td>All locations and elevations</td>
</tr>
<tr>
<td>Select fill</td>
<td>CL and/or SC (LL≤40) and (7≤PI≤18)</td>
<td>All locations and elevations</td>
</tr>
<tr>
<td>On-site soils</td>
<td>SC</td>
<td>SC soils may be used as select fill provided they meet the select fill criteria.</td>
</tr>
</tbody>
</table>

1 Prior to any filling operations, samples of the proposed borrow and on-site materials should be obtained for laboratory moisture-density testing. The tests will provide a basis for evaluation of fill compaction by in-place density testing. A qualified soil technician should perform sufficient in-place density tests during the filling operations to evaluate that proper levels of compaction, including dry unit weight and moisture content, are being attained.

2 Granular select fill should consist of cohesive crushed limestone material with a maximum aggregate size of 3 inches and PI between 5 and 12. Pavement base course requirements are provided elsewhere in the report.

4.2.4 Compaction Requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>Fill Lift Thickness</td>
<td>All fill should be placed in thin, loose lifts not to exceed 8 inches, with compacted thickness of about 6 inches.</td>
</tr>
<tr>
<td>Compaction of Onsite Soil, Select Fill and Granular Soils</td>
<td>95 percent of materials standard Proctor maximum dry density (ASTM D 698).</td>
</tr>
<tr>
<td>Moisture Content of Onsite Soil, Select Fill and Granular Soils</td>
<td>The materials should be moisture conditioned between -2 and +3 percentage points of the optimum moisture content.</td>
</tr>
</tbody>
</table>

4.2.5 Grading and Drainage
Effective drainage should be provided during construction and maintained throughout the life of the development. After building construction and landscaping, we recommend verifying final grades to document that effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted as necessary, as part of the structure's maintenance program.
Water permitted to pond next to the structure can result in distress in the structure including unacceptable, differential, floor-slab movements, cracked slabs and walls, and roof leaks. Building slab and foundation performances described in this report are based on effective drainage for the life of the structure and cannot be relied upon if effective drainage is not maintained.

Flatwork and pavements will be subject to post-construction movement. Maximum grades practical should be used for paving and flatwork to prevent water from ponding. Allowances in final grades should also consider post-construction movement of flatwork, particularly if such movement would be critical. Where paving or flatwork abuts the structure, effectively seal and maintain joints to prevent surface water infiltration. In areas where sidewalks or paving do not immediately adjoin the structure, we recommend that protective slopes be provided with a grade of at least five percent for at least 10 feet from perimeter walls. Backfill against grade beams, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of construction debris to reduce the possibility of moisture infiltration.

Planters and other surface features which could retain water in areas adjacent to the structures should be properly drained, designed, sealed or eliminated. Landscaped irrigation adjacent to the foundation systems should be properly designed and controlled to help maintain a relatively constant moisture content within 5 feet of the structure.

Collect roof runoff in drains or gutters. Discharge roof drains and downspouts onto pavements and/or flatwork which slope away from the structure or extend downspouts a minimum of 5 feet away from building.

4.2.6 Earthwork Construction Considerations
It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively stable. However, the stability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unstable conditions develop, workability may be improved by scarifying and drying. Overexcavation of wet zones and replacement with granular materials may be necessary. Lightweight excavation equipment may be required to reduce subgrade pumping.

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to floor slab and pavement construction.
As a minimum, all temporary excavations should be sloped or braced as required by Occupational Health and Safety Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

4.3 Foundations

The types and depths of foundations suitable for given structures depend on several factors including the subsurface conditions, the functions of the structures, the loads they will carry, and the cost of the foundations. Recommendations for slab-on-grade foundation and spread footing systems are provided in the following sections.

4.3.1 Slab-on-Grade Foundation

A slab and grade beam foundation may be considered to support the proposed building provided the subgrade is prepared as discussed in the Building Pad Preparation section of this report. Parameters commonly used to design this type of foundation are provided on the table below. The slab foundation design parameters presented are based on the criteria published by the Wire Reinforcing Institute (WRI) and the Building Research Advisory Board (BRAB) and the Post-Tensioning Institute (PTI) 3rd edition. These are essentially empirical design methods and the recommended design parameters are based on our understanding of the proposed project, our interpretation of the information and data collected as a part of this study, our area experience, and the criteria published in the WRI and BRAB and PTI design manuals.

<table>
<thead>
<tr>
<th>Conventional Method</th>
<th>Prepared Subgrade ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Allowable Bearing Pressures ²</td>
<td>2,000 psf</td>
</tr>
<tr>
<td>Subgrade Modulus (k)</td>
<td>80 pci</td>
</tr>
<tr>
<td>Potential Vertical Rise (PVR) ¹</td>
<td>about 1 inch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BRAB/WRI Methods</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Plasticity Index (Pl) ³</td>
<td>15</td>
</tr>
<tr>
<td>Climatic Rating (Cw)</td>
<td>16</td>
</tr>
<tr>
<td>Unconfined Compressive Strength</td>
<td>1.0 tsf</td>
</tr>
<tr>
<td>Soil Support Index (C)</td>
<td>0.95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PTI Method 3rd Edition</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thornthwaite Moisture Index (ln)</td>
<td>-20</td>
</tr>
<tr>
<td>Depth of Constant Soil Suction</td>
<td>9 feet</td>
</tr>
<tr>
<td>Constant Soil Suction</td>
<td>3.8 pF</td>
</tr>
</tbody>
</table>

| Edge Moisture Variation Distance (em): |   |

[Table content continued]
<table>
<thead>
<tr>
<th>Center Lift</th>
<th>9.0 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edge Lift</td>
<td>4.5 feet</td>
</tr>
<tr>
<td>Differential Soil Movement (yn):</td>
<td></td>
</tr>
<tr>
<td>Center Lift</td>
<td>0.2 inch</td>
</tr>
<tr>
<td>Edge Lift</td>
<td>0.5 inch</td>
</tr>
<tr>
<td>Coefficient of Slab-Subgrade Friction (μ):</td>
<td>0.75 to 1.00</td>
</tr>
</tbody>
</table>

1. Based on preparing the building pad as discussed in this report.
2. The net allowable bearing pressures provided above include a Factors of Safety (FS) of at least 3.
3. The BRAB effective PI is equal to the near surface PI if that PI is greater than all of the PI values in the upper 15 feet.

We recommend that the exterior grade beams be at least 30 inches below Finished Floor Elevation (FFE). These recommendations are for proper development of bearing capacity for the continuous beam sections of the foundation system and to reduce the potential for water to migrate beneath the slab foundation. These recommendations are not based on structural considerations. Grade beam depths may need to be greater than recommended herein for structural considerations and should be properly evaluated and designed by the Structural Engineer.

For a slab foundation system designed and constructed as recommended in this report, post construction settlements due to the fill may exceed 1 inch. Settlement response of a select fill supported slab is influenced more by the quality of construction than by soil-structure interaction. Therefore, it is essential that the recommendations for foundation construction be strictly followed during the construction phases of the building pad and foundation.

The use of a vapor retarder should be considered beneath concrete slabs-on-grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings, or when the slabs will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer and slab contractor should refer to ACI 302 for procedures and cautions about the use and placement of a vapor retarder.

### 4.3.2 Slab-on-Grade Construction Considerations

The grade beams should preferably be neat excavated. Excavation should be accomplished with a smooth-mouthed bucket. If a toothed bucket is used, excavation with this bucket should be stopped 6 inches above the final bearing surface and the excavation completed with a smooth-mouthed bucket or by hand labor. If neat excavation is not possible then the foundation should be overexcavated and formed. All loose materials should be removed from the overexcavated areas and filled with lean concrete or compacted cement stabilized sand (two sacks cement to one cubic yard of sand) or flowable fill. Due to the presence of sand, caving of grade beam excavations may occur, therefore the foundation contractor should be prepared to use forms.
To reduce the potential for water infiltration into the excavations and to minimize disturbance to the bearing area, we recommend that concrete and steel be placed as soon as possible after the excavations are completed. Excavations should not be left open for more than 36 hours. The bearing surface of the footings should be evaluated after excavation is completed and immediately prior to placing concrete. If not, a seal slab consisting of lean concrete should be poured to protect the exposed foundation soils. The bearing surface should be excavated with a slight slope to create an internal sump for runoff water collection and removal. If surface runoff water in excess of 1 inch accumulates at the bottom of the excavation, it should be pumped out prior to concrete placement. Under no circumstances should water be allowed to adversely affect the quality of the bearing surface.

4.3.3 Spread Footings
Spread footings may be used to support the building and the canopies. Design recommendations for shallow foundations for the proposed structures are presented in the table below.

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net allowable bearing pressure(^1)</td>
<td>2,000 psf</td>
</tr>
<tr>
<td>Minimum width</td>
<td>30 inches</td>
</tr>
<tr>
<td>Minimum embedment below finished grade for bearing</td>
<td>36 inches</td>
</tr>
<tr>
<td>Approximate heave or total settlement from foundation loads(^2)</td>
<td>&lt;1 inch</td>
</tr>
<tr>
<td>Allowable Net passive pressure(^3)</td>
<td>250 pcf, equivalent fluid density</td>
</tr>
<tr>
<td>Ultimate coefficient of sliding friction(^4)</td>
<td>0.40</td>
</tr>
</tbody>
</table>

\(^1\) The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Assumes any soft soils, if encountered, will be undercut and replaced with compacted structural fill. Based upon a minimum Factor of Safety of 3.

\(^2\) The above settlement estimates from foundation loads have assumed that the maximum footing size is 5.5 feet for column footings and 1.5 feet for continuous footings.

\(^3\) The spread footing foundation excavation sides must be nearly vertical and the concrete should be placed neat against these vertical faces for the passive earth pressure values to be valid. If the loaded side is sloped or benched, and then backfilled, the allowable passive pressure will be significantly reduced. Passive resistance in the upper 12 inches of the soil profile should be neglected.

\(^4\) We recommend a factor of safety of 2 to be applied to the ultimate value.
The spread footings can provide some uplift resistance for those structures subjected to wind or other induced structural loading. The uplift resistance of a spread footing may be computed using the effective weight of the soil above the spread footing along with the weight of the spread footing and structure. A soil unit weight of 120 pcf may be assumed for the on-site soils placed above the footing, provided the fill is properly compacted.

4.3.4 Spread Footings Construction Considerations

Spread footing foundations should be neatly excavated. Excavation should be accomplished with a smooth-mouthed bucket. If a toothed bucket is used, excavation with this bucket should be stopped 6 inches above the final bearing surface and the excavation completed with a smooth-mouthed bucket or by hand labor. If neat excavation is not possible then the foundation should be over excavated and formed. All loose materials should be removed from the over excavated areas and filled with lean concrete or compacted cement stabilized sand (two sacks cement to one cubic yard of sand) or flowable fill. If footing excavation starts caving, then the foundation contractor should be prepared to use forms.

Steel and concrete for spread footings should be placed within 36 hours of excavation. If not, a seal slab consisting of lean concrete should be constructed to protect the exposed foundation soils. The bearing surface should be excavated with a slight slope to create an internal sump for runoff water collection and removal. If surface runoff water accumulates at the bottom of the excavation, it should be pumped out prior to concrete placement. Under no circumstances should water be allowed to adversely affect the quality of the bearing surface.

If the spread footing is buried, backfill above the foundation may be the excavated on-site soils or select fill soils. Backfill soils should be compacted to at least 95 percent of the maximum dry unit weight as determined by the standard moisture/density test (ASTM D 698) at moisture contents ranging from -2 to +3 percentage points of the optimum moisture content. The backfill should be placed in thin, loose lifts not to exceed 8 inches, with compacted thickness not to exceed 6 inches.

If unsuitable bearing soils are encountered in footing excavations, the excavation could be extended deeper to suitable soils and the footing could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. As an alternative, the footings could also bear on properly compacted structural backfill extending down to the suitable soils. Overexcavation for compacted structural fill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with well graded granular material placed in lifts of 8 inches or less in loose thickness (6 inches or less if using hand-guided compaction equipment) and compacted to at least 95 percent of the material's standard effort maximum dry density (ASTM D 698). The overexcavation and backfill procedure is described in the following figure.
4.3.5 Foundation Construction Monitoring

The performance of the foundation system for the proposed structure will be highly dependent upon the quality of construction. Thus, we recommend that fill pad compaction and foundation installation be monitored full time by an experienced Terracon soil technician under the direction of our Geotechnical Engineer. During foundation installation, the base should be monitored to evaluate the condition of the subgrade. We would be pleased to develop a plan for compaction and foundation installation monitoring to be incorporated in the overall quality control program.

4.4 Seismic Considerations

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 International Building Code Site Classification (IBC) (^1)</td>
<td>C (^2)</td>
</tr>
<tr>
<td>Site Latitude (Degrees)</td>
<td>28.31172°N</td>
</tr>
<tr>
<td>Site Longitude (Degrees)</td>
<td>99.40681°W</td>
</tr>
<tr>
<td>Mapped Spectral Acceleration for Short Periods (0.2-Second): (S_s) (^3)</td>
<td>0.063 g</td>
</tr>
<tr>
<td>Mapped Spectral Acceleration for a 1-Second Period: (S_s) (^3)</td>
<td>0.021 g</td>
</tr>
</tbody>
</table>

\(^1\) The site class definition was determined using SPT N-values in conjunction with section 1613.3.2 in the 2012 IBC and Table 20.3-1 in the 2010 ASCE-7.

\(^2\) Borings extended to a maximum depth of 20 feet, and this seismic site class definition considers that hard soil continues below the maximum depth of the subsurface exploration.

\(^3\) The Spectral Acceleration values were determined using publicly available information provided on the United States Geological Survey (USGS) website. The spectral acceleration values can be used to determine the site coefficients using Tables 1613.3.3 (1) and 1613.3.3 (2) in the 2012 IBC.

4.5 Pavements

Both asphalt and concrete pavements will be considered for drive lanes and general parking areas. Pavement subgrade preparations are included in this section to limit changes in soil moisture conditions to help mitigate the effects of soil movement; however, even if these recommendations are followed some pavement distress could still occur.
4.5.1 Subgrade Preparation
Prior to placing any fill, any vegetation, loose topsoil, and any otherwise unsuitable materials should be removed from the new pavement areas. After stripping, the subgrade should be proof-rolled where possible to aid in locating loose or soft areas. Proof-rolling can be performed with a 15-ton roller or fully loaded dump truck. Wet, soft, low-density or dry material should either be removed or moisture conditioned and compacted to the moisture contents and densities described in section Compaction Requirements prior to placing fill. Pavement constructed on fill may experience excessive settlement and cracking unless the entire fill body is completely removed.

4.5.2 Pavement Design Considerations
For this project Light and Heavy pavement section alternatives have been provided. Light is for areas expected to receive only car traffic. Heavy assumes areas with heavy traffic, such as trash pickup areas and main access drive areas.

4.5.3 Estimates of Minimum Pavement Thickness
Based on the assumed traffic load and encountered soil conditions, we recommend the following typical pavement sections be considered for this project.

<table>
<thead>
<tr>
<th></th>
<th>FLEXIBLE PAVEMENT SYSTEM (inches)</th>
<th>RIGID PAVEMENT SYSTEM (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Light Duty</td>
<td>Heavy Duty</td>
</tr>
<tr>
<td>Hot Mix Asphaltic Concrete</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Base Material</td>
<td>6.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Cement Treated Subgrade</td>
<td>6.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>

1 Asphaltic base material may be used in place of granular, unbound base material. Every 2½ inches of granular base material may be replaced with 1 inch of asphaltic base material. However, the minimum thickness of the asphaltic base material is 4 inches.

Proper perimeter drainage is very important and should be provided so infiltration of surface water from unpaved areas surrounding the pavement is minimized. We do not recommend installation of landscape beds or islands in the pavement areas. Such features provide an avenue for water to enter into the pavement section and underlying soil subgrade. Water penetration usually results in degradation of the pavement section with time as vehicular traffic traverses the affected area. Above grade planter boxes, with drainage discharge onto the top of the pavement or directed into sewers, should be considered if landscape features are desired.
Curbs should extend through the base and at least 3 inches into the soil subgrade below the base course. This will help reduce migration of subsurface water into the pavement base course from adjacent areas. A crack sealant compatible to both asphalt and concrete should be provided at all concrete-asphalt interfaces.

Pavement areas that will be subjected to heavy wheel and traffic volumes, such as waste bin or "dumpster" areas, entrance/exit ramps, and delivery areas, should be a rigid pavement section constructed of reinforced concrete. The concrete pavement areas should be large enough to properly accommodate the vehicular traffic and loads. For example:

- The dumpster pad should be large enough so that the wheels of the collection truck are entirely supported on the concrete pavement during lifting of the waste bin; and
- The concrete pavement should extend beyond any areas that require extensive turning, stopping, and maneuvering.

The pavement design engineer should consider these and other similar situations when planning and designing pavement areas. Waste bin and other areas that are not designed to accommodate these situations often result in localized pavement failures.

The pavement section has been designed using generally recognized structural coefficients for the pavement materials. These structural coefficients reflect the relative strength of the pavement materials and their contribution to the structural integrity of the pavement. If the pavement does not drain properly, it is likely that ponded water will infiltrate the pavement materials resulting in a weakening of the materials. As a result, the structural coefficients of the pavement materials will be reduced and the life and performance of the pavement will be shortened. The Asphalt Institute recommends a minimum of 2 percent slope for asphalt pavements. The importance of proper drainage cannot be overemphasized and should be thoroughly considered by the project team.

The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.
4.5.4 Pavement Section Materials
Presented below are selection and preparation guidelines for various materials that may be used to construct the pavement sections. Submittals should be made for each pavement material. The submittals should be reviewed by the Geotechnical Engineer and appropriate members of the design team and should provide test information necessary to verify full compliance with the recommended or specified material properties.

- **Hot Mix Asphaltic Concrete Surface Course** - The asphaltic concrete surface course should be plant mixed, hot laid Type C or D Surface. The asphaltic concrete base course should also be plant mixed, hot laid Type A or B. Each mix should meet the master specifications requirements of 2004 TxDOT Standard Specifications Item 341, Item SS 3224 (2011) and specific criteria for the job mix formula. The mix should be compacted between 91 and 95 percent of the maximum theoretical density as measured by TEX-227-F. The asphalt cement content by percent of total mixture weight should fall within a tolerance of ±0.3 percent asphalt cement from the specific mix. In addition, the mix should be designed so 75 to 85 percent of the voids in the mineral aggregate (VMA) are filled with asphalt cement. The grade of the asphalt cement should be PG 64-22 or higher performance grade. Aggregates known to be prone to stripping should not be used in the hot mix. If such aggregates are used measures should be taken to mitigate this concern. The mix should have at least 70 percent strength retention when tested in accordance with TEX-531-C.

Pavement specimens, which shall be either cores or sections of asphaltic pavement, will be tested according to Test Method TEX-207-F. The nuclear-density gauge or other methods which correlate satisfactorily with results obtained from project pavement specimens may be used when approved by the Engineer. Unless otherwise shown on the plans, the Contractor shall be responsible for obtaining the required pavement specimens at their expense and in a manner and at locations selected by the Engineer.

- **Concrete** - Concrete should have a minimum 28-day design compressive strength of 4,000 psi.

- **Granular Base Material** Base material may be composed of crushed limestone base/ crushed concrete meeting all of the requirements of 2004 TxDOT Item 247, Type A or D, Grade 1 or 2; including triaxial strength. The material should be compacted to at least 95 percent of the maximum dry density as determined in accordance with ASTM D 1557 at moisture contents ranging from -2 and +3 percentage points of the optimum moisture content.

- **Modified Subgrade** - Due to the presence of sand, the subgrade may be treated with cement with accordance with TxDOT Item 275 in order to improve its strength and load carrying capacity. The subgrade soil should be tested for sulfate prior to
the use of cement. We anticipate that approximately 5 percent cement will be
required. This is equivalent to about 33 pounds of cement per square yard for an
8-inch treatment depth. However, the actual percentage should be determined by
laboratory tests on samples of the subgrade prior to construction. The cement soil
mixture should be remixed and compacted to at least 95 percent of the maximum
dry density determined in accordance with ASTM D 698 at moisture contents
ranging from minus two (-2) to plus three (+3) percentage points of the optimum
moisture content. Compaction should be completed within 6 hours of cement soil
mixing.

Moisture Conditioned Subgrade - The subgrade should be scarified to a depth
of 6 inches and then moisture conditioned and compacted as recommended in the
Compaction Requirements section of this report.

Details regarding subgrade preparation, fill materials, placement and compaction are presented
in Earthwork section under subsections Fill Materials and Placement and Compaction
Requirements.

4.5.5 Pavement Joints and Reinforcement
The following is recommended for all concrete pavement sections in this report. Refer to ACI 330
“Guide for Design and Construction of Concrete Parking Lots” for additional information.

Contraction Joint Spacing: 12½ feet each way for pavement thickness of 5 inches; 15
feet each way for pavement thickness of 6 or greater.

Contraction Joint Depth: At least ¼ of pavement thickness.

Contraction Joint Width: One-fourth inch or as required by joint sealant
manufacturer.

Construction Joint Spacing: To attempt to limit the quantity of joints in the pavement,
consideration can be given to installing construction joints at contraction joint locations, where it is applicable.

Construction Joint Depth/Width: Full depth of pavement thickness. Construct sealant
reservoir along one edge of the joint. Width of reservoir to be ¼ inch or as required by joint sealant manufacturer.
Depth of reservoir to be at least ¼ of pavement thickness.

Isolation Joint Spacing: As required to isolate pavement from structures, etc.

Isolation Joint Depth: Full depth of pavement thickness.

Isolation Joint Width: One-half to 1 inch or as required by the joint sealant
manufacturer.
Expansion Joint: None (see note below)

Note: Long, linear pavements may require expansion joints. However, in this locale, drying shrinkage of concrete typically significantly exceeds anticipated expansion due to thermal affects. As a result, the need for expansion joints is eliminated provided all joints (including saw cuts) are sealed. Construction of an unnecessary joint may be also become a maintenance problem. All joints should be sealed. If all joints, including sawcuts, are not sealed then expansion joints should be installed.

Distributed Steel: Steel reinforcement may consist of steel bars described as follows:

- No. 3 reinforcing steel bars at 18 inches on-center-each-way, Grade 60.
- No. 4 reinforcing steel bars at 24 inches on-center-each-way, Grade 60.

Note: It is imperative that the distributed steel be positioned accurately in the pavement cross section, namely 2 inches from the top of the pavement.

All construction joints have dowels. Dowel information varies with pavement thickness as presented as follows:

<table>
<thead>
<tr>
<th>Pavement Thickness:</th>
<th>Dowel Spacing:</th>
<th>Dowel Length:</th>
<th>Dowel Embedment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 inches</td>
<td>¾ inch diameter</td>
<td>12 inches on center</td>
<td>5 inches</td>
</tr>
<tr>
<td>6 inches</td>
<td>¾ inch diameter</td>
<td>12 inches on center</td>
<td>6 inches</td>
</tr>
</tbody>
</table>

4.5.6 Pavement Drainage
Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section.

4.5.7 Pavement Maintenance
The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.
5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur away from our boring, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided. Prospective subcontractors should familiarize themselves with the conditions at the site and retain their own experts to interpret the data in this report and perform additional testing and/or inspection as they deem necessary prior to bidding.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.
APPENDIX A
Field Exploration Description

The subsurface conditions at the site were explored by drilling two soil borings to depths of approximately 6 to 10 feet below the existing grade. The proposed boring locations were located in the field by a Terracon representative using a scaled site plan provided by the client. Elevations of the ground surface at the boring locations were not provided to Terracon and should be determined by others prior to construction. Therefore, the references to depth of the various materials encountered are from the existing grade at the time of drilling.

A truck-mounted drill rig equipped with continuous flight augers was used to advance the boreholes. Soil samples were obtained by the split-barrel sampling procedure. A standard 2-inch O.D. split-barrel sampling spoon is driven into the ground with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the standard penetration resistance value (SPT-N). These values are indicated on the borings logs at the depths of occurrence.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled with soil cuttings prior to the drill crew leaving the site.

Our field representative prepared the field logs as part of the drilling operations. The field logs included visual classifications of the materials encountered during drilling and our field representative interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's/geologist's interpretation of the field logs and include modifications based on visual observations, laboratory observations and testing of the samples in the laboratory.

The scope of services for our geotechnical engineering services does not include addressing any environmental issues pertinent to the site.
APPENDIX B
Laboratory Testing
Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in this Appendix. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Moisture Content
- Soils Finer than No. 200 Mesh Sieve

Sample Disposal
All samples were returned to our laboratory. The samples not tested in the laboratory will be stored for a period of 30 days subsequent to submittal of this report and will be discarded after this period, unless other arrangements are made prior to the disposal period.
**UNIFIED SOIL CLASSIFICATION SYSTEM**

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests

<table>
<thead>
<tr>
<th>Coarse Grained Soils: More than 50% retained on No. 200 sieve</th>
<th>Soil Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravels: More than 50% of coarse fraction retained on No. 4 sieve</td>
<td>Group Symbol</td>
</tr>
<tr>
<td>Clean Gravels: Less than 5% fines c</td>
<td>Cu ≥ 4 and 1 ≤ Cc ≤ 3</td>
</tr>
<tr>
<td>Gravels with Fines: More than 12% fines c</td>
<td>Cu &lt; 4 and/or 1 &gt; Cc &gt; 3</td>
</tr>
<tr>
<td>Sands: 50% or more of coarse fraction passes No. 4 sieve</td>
<td>Fines classify as ML or MH</td>
</tr>
<tr>
<td>Clean Sands: Less than 5% fines d</td>
<td>Cu ≥ 6 and 1 ≤ Cc ≤ 3</td>
</tr>
<tr>
<td>Sands with Fines: More than 12% fines d</td>
<td>Cu &lt; 6 and/or 1 &gt; Cc &gt; 3</td>
</tr>
<tr>
<td>Silts and Clays: Liquid limit less than 50</td>
<td>Fines classify as ML or MH</td>
</tr>
<tr>
<td>Inorganic: Pl &gt; 7 and plots on or above “A” line j</td>
<td>Fines classify as CL or CH</td>
</tr>
<tr>
<td>Organic: Liquid limit - oven dried</td>
<td>&lt; 0.75</td>
</tr>
<tr>
<td>Silts and Clays: Liquid limit 50 or more</td>
<td>Liquid limit - not dried</td>
</tr>
<tr>
<td>Inorganic: Pl plots on or above “A” line j</td>
<td>Organic clay</td>
</tr>
<tr>
<td>Organic: Liquid limit - oven dried</td>
<td>Organic clay</td>
</tr>
<tr>
<td>Highly organic soils: Primarily organic matter, dark in color, and organic odor</td>
<td>Liquid limit - not dried</td>
</tr>
</tbody>
</table>

a Based on the material passing the 3-inch (75-mm) sieve
b If field sample contains cobbles or boulders, or both, add “with cobbles or boulders, or both” to group name.
c Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
d Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

\[ C = \frac{(D_{10})^2}{D_{95} \times D_{60}} \]

*If fines are organic, add “with organic fines” to group name.
1 If soil contains ≥ 15% gravel, add “with gravel” to group name.
2 If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
3 If soil contains 15 to 29% plus No. 200, add “with sand” or “with gravel,” whichever is predominant.
4 If soil contains ≥ 30% plus No. 200 predominantly sand, add “sandy” to group name.
5 If soil contains ≥ 30% plus No. 200 predominantly gravel, add “gravely” to group name.
6 Pl ≥ 4 and plots on or above “A” line.
7 Pl < 4 or plots below “A” line.
8 Pl plots on or above “A” line.
9 Pl plots below “A” line.

For classification of fine-grained soils and fine-grained fraction of coarse-grained soils

- Equation of “A” line: Horizontal at PI=4 to LL=25.5, then PI=0.73 (LL=20)
- Equation of “U” line: Vertical at LL=16 to PI=7, then PI=0.9 (LL=8)

Exhibit C-2
Part 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Project information.
   2. Work covered by Contract Documents.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

The Work of Project is defined by the Contract Documents and consists of the construction of two building structures. The construction includes concrete slab, standard wood framing with wood trusses. Metal structural members at porch and carport, septic system, MEP systems, and finishes per other sections of the specifications.

A. This section describes the Project in general and provides an overview of the extent of the Work to be performed by the CONTRACTOR. Detailed requirements and extent of Work is stated in the applicable Specification Sections and shown on the Drawings. CONTRACTOR shall, except as otherwise specifically stated herein or in any applicable part of these Contract Documents, provide and pay for all labor, materials, equipment, tools, construction equipment, and other facilities and services necessary for proper execution, testing, and completion of the Work.

B. Any part or item of the Work which is reasonably implied or normally required to make the installation satisfactorily operable shall be performed by the CONTRACTOR and the expense thereof shall be included in the applicable unit prices or lump sum prices bid for the Work. It is the intent of these Specifications to provide the OWNER with the complete system. All miscellaneous appurtenances and other items of Work that are incidental to meeting the intent of the Specifications shall be considered as having been included in the applicable unit prices or lump sum prices bid for the Work even though these appurtenances and items may not be specifically called for in the Bid Documents.

C. The Work shall include furnishing all tools, labor, materials, equipment, and miscellaneous items necessary for the complete construction of the four projects.

D. Type of Contract:
   1. Project will be constructed under a single prime contract.

1.4 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.5 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or
other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.6 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

1.7 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

C. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

D. Easements and Rights-Of-Way

1. CONTRACTOR shall confine his construction operations within the limits indicated on the Drawings, and shall use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies so as to cause the least possible damage to property and interference with traffic. If the CONTRACTOR requires additional easement for his operations, the CONTRACTOR is solely responsible for acquisition and maintenance of the easement. No additional compensation will be provided by the OWNER.

1.8 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations.

1. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

D. Nonsmoking Building: Smoking is not permitted.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

Part 2 - PRODUCTS
(Not Used)

Part 3 - EXECUTION
(Not Used)

END OF SECTION
SECTION 01 56 39 - TEMPORARY TREE & PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including Terms and Conditions (Construction) and Technical Specifications, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Preservation and protection of plant materials within the project's site.

B. It is the intention of this specification that all plants at this project site not specifically indicated on the plans for removal shall be protected and preserved. Take all necessary precautions to avoid damage or removal of trees, shrubs, and other plant materials that are to remain following construction. Specimen trees and other plants within and closely adjacent to construction sites shall be adequately protected by the Contractor, according to plans and specifications. Additional protective measures may be installed by the Contractor at his option to preclude damage by his workmen and equipment.

PART 2 - PRODUCTS

2.1 PLANT PROTECTION DEVICES

A. Install minimum protective devices consisting of orange plastic construction fencing and "T" posts at the drip line plus one foot as detailed on drawings, of all trees within the limits of construction. At tight locations where the protection fencing will restrict the proposed construction, subject to approval by the Owner's Representative, alternative protective devices consisting of a fence a minimum of 1 foot radius for each inch caliper (thickness) from the tree to be protected or wrapping the tree trunk with two (2) inch thick wood stock from ground line to eight (8) feet above will be allowed. Maintain protective devices in good order for the duration of the construction period. Additional protective devices or barriers, required by the Owner's Representative during the course of construction, may be added to the work by field order. Protective devices so added are to be installed immediately and shall be maintained in good condition until construction is concluded. Protective devices are further detailed to include references in the specifications, or notes on the drawings as to construction limits, or other such notes that indicate the area or right-of-way in which the Contractor must work.

PART 3 - EXECUTION

3.1 EQUIPMENT AND MATERIAL STORAGE

A. Where trees, plants, shrubbery, etc. are adjacent to construction and are not scheduled to be removed:
1. Contractor shall protect them from unnecessary cutting, breaking, skinning, or bruising of roots and bark by use of boxing or fencing.
2. No stockpiling of excavated or construction materials or vehicle parking area shall be allowed within drip lines.
3. Foot and vehicular traffic within drip lines shall be minimized.
4. If it is or becomes necessary to remove or damage vegetation contrary to protection requirements, the Contractor shall make written request to and obtain approval from the Owner prior to beginning the work in conformance with 3.04 below.
3.2 BURNING

A. Fires are prohibited within the limits of construction unless the Owner's Representative grants approval. Approved burning will be kept within designated areas, and shall be kept under constant surveillance. Failure to maintain close surveillance will be cause for the Owner's cancellation of the burning privilege. The Contractor at his expense, as may be required, shall obtain burn permits.

3.3 REPARATION FOR DAMAGES

A. Contractor is liable for all unauthorized vegetation damages and shall bear all costs or subsequent appraisal and restoration.
   1. Appraisal: The Owner may request that unauthorized damage be appraised by a horticulturist, botanist, arborist, or forester from the Owner's staff who shall appraise damage values under the latest edition of Guidelines for Established Values of Trees and Plants, published by the Council of Tree and Landscape Appraisers, 232 Southern Building, Washington, D.C. 20005.
   2. Restoration: Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner acceptable to the Owner. In the case of more serious damage, the Owner may require the Contractor to employ an arborist to repair damages to trees and shrubs. Replace trees that cannot be repaired and restored to full growth status, as determined by the arborist.

3.4 PLANT PRUNING AND LIMB REMOVAL

A. Plant protection requirements cited above shall include authorized pruning and cutting of limbs and major roots. The Contractor is cautioned not to cut, prune or otherwise remove plant parts without prior approval and guidance by the Owner. All cutting or pruning that may be required by construction shall be approved prior to beginning such work and shall be accomplished by a Certified Arborist to be employed by the Contractor at the Contractor's expense.

END OF SECTION
SECTION 02 36 10 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

B. This section applies to the Chaparral Bunkhouses.

1.2 SUMMARY

A. This Section includes soil treatment for termite control prior to placement of vapor barrier under concrete work at all areas of construction.

1.3 SUBMITTALS

A. Product Data application instructions.

B. Material Certificates: Certificates that products used comply with U.S. Environmental Protection Agency (EPA) regulations for termicides.

1.4 QUALITY ASSURANCE

A. Engage a professional pest control operator, licensed in accordance with regulations of governing authorities for application of soil treatment.

B. Use only termicides which bear a Federal registration number of the EPA and are approved by local authorities having jurisdiction.

1.5 JOB CONDITIONS

A. Restrictions: Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

B. To insure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with handling and application instructions of the soil toxicant manufacturer.

1.6 WARRANTY

A. Warranty: Furnish written warranty certifying that applied solid termicide treatment will prevent infestation of subterranean termites and that if subterranean termite activity is discovered during warranty period, Contractor shall re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT SOLUTION

A. General: Use an emulsiible concentrate termicide for dilution with water, specially formulated to prevent termites' infestation. Fuel oil will not be permitted as a diluent. Provide a solution consisting of one of following chemical elements.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Chloropyrifos:
   a. Dursban TC; Dow Chemical Co.
2. Permethrin:
   a. Dragnet FT, FMC Corp.
   b. Toredo, ICI Americas, Inc.
3. Cypermethrine:
   a. Prevail FT, FMC Corp.
   b. Demon, ICI Americas, Inc.
4. Isofenphos:
   a. Pryfon, Mobay Corp.

C. Dilute with water to concentration level recommended by manufacturer.

D. Other solutions may be used as recommended by Applicator if also acceptable to Owner's Representative and approved for intended application by jurisdictional authorities. Use only soil treatment solutions which are not harmful to plants.

PART 3 - EXECUTION

3.1 APPLICATION

A. Surface Preparations: Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen, rake and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer.

B. Applications Rates: Apply soil treatment solution as follows:
   1. Under slab on grade structures, treat soil before concrete slabs are placed, using the following rates of application:
      a. Apply one gallon of chemical solution per 10 sq. ft. as an overall treatment under slab and attached slab areas where fill is soil.
      b. Apply 4 gallons of chemical solution per 10 lin. ft. of trench, for each foot of depth from grade of footing or utility trench.
   2. At expansion joints, control joints and areas where slabs will be penetrated, apply at rate of 4 gals. Per 10 lin. ft. of penetration.
   3. Exterior Foundation: Apply 4 gallons per 10 lineal feet of trench along outside edge of building.
      a. Dig trench 6 inches to 8 inches wide along outside of foundation to minimum depth of 12 inches and apply toxicant.
      b. Mix toxicant with soil as it is being backfilled.

C. Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs when areas are covered by other construction.

D. Reapply soil treatment solution to areas distributed by subsequent excavation, landscape grading, or other construction activities following application.

END OF SECTION
SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Slabs-on-grade foundation.

B. WORK INCLUDED

1. Design, fabrication, erection, and stripping of formwork for cast-in-place concrete including falsework, bracing, proprietary forming systems, prefabricated forms, bulkheads, keys, blockouts, sleeves, pockets, and accessories. Erection shall include installation in formwork of items furnished by other trades.

2. Furnish all labor and materials required to fabricate, deliver and install reinforcement and embedded metal assemblies for cast-in-place concrete, including steel bars, welded steel wire fabric, ties and supports.

3. Furnish all labor and materials required to perform the following:
   a. Cast-in-place concrete
   b. Concrete mix designs
   c. Grouting structural steel baseplates

C. Related Sections include the following:

1. Division 32 Section “Concrete Paving” for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, Slag Cement, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Design Mixtures: For each concrete mixture submit proposed mix designs in accordance with ACI 318, chapter 5. Each proposed mix design shall be accompanied by a record of past performance.

1. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
2. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1. Do not reproduce the structural drawings for use as shop drawings.
2. Embedded metal assemblies: Submit shop drawings for fabrication and placement. Use standard AWS welding symbols.

D. Steel Reinforcement Submittals for Information: Mill test certificates of supplied concrete reinforcing, indicating physical and chemical analysis.

E. Welding certificates.

F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates.

G. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials
2. Admixtures
3. Form materials and form-release agents
4. Steel reinforcement and accessories
5. Curing compounds
6. Floor and slab treatments
7. Bonding agents
8. Adhesives
9. Vapor retarders
10. Joint-filler strips
11. Repair materials

H. Submit manufacturer's certification of maximum chloride ion content in admixtures.

I. Fly ash: Submit certification attesting to carbon content and compliance with ASTM C618.

J. Construction Joint Layout: Submit a diagram of proposed construction joint locations for horizontal framing that exceed the limits of a single placement as stated in the structural notes, other than those indicated on the Drawings.
K. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

L. Field quality-control test and inspection reports.

M. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete,"
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Owner may engage a qualified independent testing agency to perform material evaluation tests.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

   A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

   B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

   C. Store all proprietary materials in accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

   A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

      1. Plywood, metal, or other approved panel materials.
      2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

         a. High-density overlay, Class 1 or better.

      3. Steel Forms

   B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive damproofing or waterproofing.

G. Form Ties for Exposed Finishes: Water seal coil type internally disconnecting ties with tapered plastic cone spreader designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal. Plugs to fill tie cone to be in plastic or mortar to match surrounding concrete. Plugs to be recessed 1/4 inch from surface of finished concrete.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For slabs on grade and slabs on void forms, provide sand plates, horizontal runners, or precast concrete blocks on bottom where base material will not support chair legs or where vapor barrier has been specified.

2.4 MECHANICAL SPLICES

A. Provide mechanical splices designed to develop, in tension and compression, 125 percent of the minimum ASTM specified yield strength of the smaller bar being spliced. The following splicing systems are acceptable:

1. Erico "Cadweld T-Series"
2. Erico "Lenton"
3. Dayton Barssplice "Bar-Grip"
4. Dayton Barssplice "Grip-Twist"

2.5 DOWEL BAR ANCHORS

A. Provide dowel bar anchors and threaded dowels designed to develop, in tension and compression, 125 percent of the minimum ASTM specified yield strength of the dowel bars. Unless otherwise indicated, anchors shall be furnished with ACI standard 90 degree hooks. Dowels shall be furnished by the anchor supplier. The following dowel splicing systems are acceptable:

1. Richmond Screw Anchor "Dowel Bar Splicer"
2. Erico "Lenton Form Saver"
3. Dayton Barssplice "Grip-Twist"

2.6 EMBEDDED METAL ASSEMBLIES

A. Steel Shapes and Plates: ASTM A36

B. Headed Studs: Heads welded by full-fusion process, as furnished by TRW Nelson Stud Welding Division.

2.7 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with the following:
   a. Fly Ash: ASTM C 618, Class F or C.
   b. Slag Cement: ASTM C 989, Grade 100 or 120.
B. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: As indicated on drawings.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.


2.8 ADMIXTURES


B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.9 WATERSTOPS


B. VAPOR RETARDERS

C. Plastic Vapor Retarder: ASTM E 1745, Class A.

1. Membrane shall have the following properties:
   a. Minimum 10 mils thickness.
   b. Permeance Rating: ASTM E96, 0.01 Perms [grains/(ft² * hr * psi)] or lower as tested after mandatory conditioning (ASTM E 154 sections 8, 11, 12, 13)
   c. Installation shall be in accordance with ASTM E1643 and manufacturer’s instructions.

2. Products:
   a. Carlisle Coatings & Waterproofing, Inc.: Blackline 400.
   b. Epro; Ecoshield-E 15 mil.
   c. Inteplast Group; Barrier Bac VBC-350 Composite Vapor Retarder
   d. Reef Industries; Vaporguard.
   e. Stego Wrap 15 mil, by Stego.

3. Accessories

a. Perimeter/seam sealing tape for use with membranes that are not self-adhering to the underside of concrete slabs on void forms:
   1) Crete Claw detail tape by Stego Industries, LLC, for adhering vapor retarder membrane to the underside of concrete surface at slabs on carton void forms, 3-inch and 6-inch widths as noted in Part 3.
   2) StegoTack double-sided adhesive tape by Stego Industries, LLC, for adhering membrane to concrete at gradebeams.

b. Manufacturer's recommended standard adhesive or pressure sensitive tape for general use.

2.10 CURING MATERIALS

A. General: Do not use any chemical curing compounds at any concrete slabs to receive polished concrete finish. Cure polished slabs only with fine mist spray of water, and covers of type as required by weather conditions.

B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products:

   a. Axiom Concrete Technologies; CATEXOL Cimfilm.
   b. BASF Construction Chemicals – Building Systems; Confilm.
   c. ChemMasters; Spray-Film.
   d. Conspec by Dayton Superior; Aquafilm.
   e. Dayton Superior Corporation; Sure Film (J-74).
   f. Edoco by Dayton Superior; BurkeFilm.
   g. Euclid Chemical Company (The), an RPM company; Eucobar.
   h. Kaufman Products, Inc.; Vapor Aid.
   i. Lambert Corporation; LAMBCO Skin.
   j. L&M Construction Chemicals, Inc.; E-Con.
   k. Meadows, W. R., Inc.; EVAPRE.
   l. Metalcrete Industries; Waterhold.
   m. Nox-Crete Products Group; Monofilm.
   n. Sika Corporation, Inc.; SikaFilm.
   o. SpecChem, LLC; Spec Film.
   p. Symons by Dayton Superior; Finishing Aid.
   q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
   r. Unitex; Pro-Film.
   s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
D. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

E. Water: Potable.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products:
   a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
   b. BASF Construction Chemicals – Building Systems; Kure 200.
   c. ChemMasters; Safe-Cure Clear.
   d. Conspec by Dayton Superior; W.B. Resin Cure.
   e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
   f. Edoco by Dayton Superior; Res X Cure WB.
   g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
   i. Lambert Corporation; Aqua Kure-Clear.
   j. L&M Construction Chemicals, Inc.; L&M Cure R.
   l. Nox-Crete Products Group; Resin Cure E.
   m. Right Pointe; Clear Water Resin.
   n. SpecChem, LLC; Spec Rez Clear.
   o. Symons by Dayton Superior; Resi-Chem Clear.
   p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
   q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

1. Products:
   a. Anti-Hydro International, Inc.; AH Clear Cure WB.
   b. BASF Construction Chemicals – Building Systems; Kure-N-Seal WB.
   c. ChemMasters; Safe-Cure & Seal 20.
   d. Conspec by Dayton Superior; Cure and Seal WB.
   e. Cresset Chemical Company; Crete-Trete 309-VOC Cure & Seal.
   f. Dayton Superior Corporation; Safe Cure and Seal (J-18).
   g. Edoco by Dayton Superior; Spartan Cote WB II.
   h. Euclid Chemical Company (The), an RPM company; Aqua Cure VOX; Clearseal WB 150.
   j. Lambert Corporation; Glazcote Sealer-20.
   k. L&M Construction Chemicals, Inc.; Dress & Seal WB.
   m. Metalcrete Industries; Metcure.
   n. Nox-Crete Products Group; Cure & Seal 150E.
   o. Symons by Dayton Superior; Cure & Seal 18 Percent E.
p. TK Products, Division of Sierra Corporation; TK-2519 WB.
q. Vexcon Chemicals, Inc.; Starseal 309.

H. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

1. Products:

a. BASF Construction Chemicals – Building Systems; Kure-N-Seal W.
b. ChemMasters; Safe-Cure Clear.
c. Conspec by Dayton Superior; High Seal.
d. Dayton Superior Corporation; Safe Cure and Seal (J-19).
e. Edoco by Dayton Superior; Spartan Cote WB II 20 Percent.
f. Euclid Chemical Company (The), an RPM Company; Diamond Clear VOX; Clearseal WB STD.
g. Kaufman Products, Inc.; SureCure Emulsion.
h. Lambert Corporation; Glazecote Sealer-20.
i. L&M Construction Chemicals, Inc.; Dress & Seal WB.
k. Metalcrete Industries; Metecure 0800.
l. Nox-Crete Products Group; Cure & Seal 200E.
m. Symons by Dayton Superior; Cure & Seal 18 Percent E.
n. Vexcon Chemicals, Inc.; Starseal 0800.

2.11 RELATED MATERIALS


B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Sleeves and Blockouts: Formed with galvanized metal, galvanized pipe, polyvinyl chloride pipe, fiber tubes, or wood.

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required; of strength and character to maintain formwork in place while placing concrete.

2.12 REPAIR MATERIALS


1. Compressive Strength: 1200 psi minimum at 1 day; 6000 psi minimum at 28 days when tested according to ASTM C 109.
2. Bond Strength: 1800 psi minimum at 28 days when tested according to ASTM C 882 (Modified).
3. Product / Manufacturer: SikaTop 122 Plus or SikaTop 123 Plus, Sika Corporation, or approved equal.
B. Repair Mortar – Form and Pour or Pump: Pre-packaged, cement-based, single-component, polymer-modified, silica-fume-enhanced, cementitious mortar.
   1. Compressive Strength: 3000 psi minimum at 1 day; 6500 psi at 28 days when tested according to ASTM C 109.
   2. Bond Strength: 2200 psi at 28 days when tested according to ASTM C 882 (modified).
   3. Product / Manufacturer: Sika MonoTop 611, Sika Corporation, or approved equal.

2.13 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

   2. Required average strength above specified strength:

      a. Based on a record of past performance: Determination of required average strength above specified strength shall be based on the standard deviation record of the results of at least 30 consecutive strength tests in accordance with ACI 318, Chapter 5.3 by the larger amount defined by formulas 5-1 and 5-2.

      b. Based on laboratory trial mixtures: Proportions shall be selected on the basis of laboratory trial batches prepared in accordance with ACI 318, Chapter 5.3.3.2 to produce an average strength greater than the specified strength f\text{c} by the amount defined in table 5.3.2.2.

         1) Proportions of ingredients for concrete mixes shall be determined by an independent testing laboratory or qualified concrete supplier.

         2) For each proposed mixture, at least three compressive test cylinders shall be made and tested for strength at the specified age. Additional cylinders may be made for testing for information at earlier ages.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

   1. Fly Ash: 20 percent.
   4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

   1. Do not use admixtures which have not been incorporated and tested in accepted mixes.
2. Use water-reducing admixture in concrete, as required, for placement and workability.
3. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
4. Use water-reducing admixture in pumped concrete, and concrete with a water-cementitious materials ratio below 0.50.

2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Proportion normal-weight concrete mixture as indicated on drawings.

2.15 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.16 FABRICATION OF EMBEDDED METAL ASSEMBLIES

A. Fabricate metal assemblies in the shop. Holes shall be made by drilling or punching. Holes shall not be made by or enlarged by burning. Welding shall be in accordance with AWS D1.1.

B. Welding of deformed bar anchors and headed stud anchors shall be done by full fusion process equal to that of TRW Nelson Stud Welding Division. A minimum of two headed studs shall be tested at the start of each production period for proper quality control. The studs shall be capable of being bent 45 degrees without failure.

C. Welding of reinforcement shall be done in accordance with AWS D1.4, using the recommended preheat temperature and electrode for the type of reinforcement being welded. Bars larger than no. 9 shall not be welded. Welding shall be subject to the observance and testing of the Testing Laboratory.

D. Metal assemblies exposed to earth, weather or moisture shall be hot dip galvanized. All other metal assemblies shall be either hot dip galvanized or painted with an epoxy paint. Repair galvanizing after welding with a Cold Galvanizing compound installed in accordance with the manufacturer's instructions. Repair painted assemblies after welding with same type of paint.

2.17 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and furnish batch ticket information.

1. When air temperature is between 85 and 95 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 95 deg F, reduce mixing and delivery time to 60 minutes.
PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

1. Vertical alignment:
   a. Lines, surfaces and arises less than 100 feet in height - 1 inch.

2. Lateral alignment:

3. Level alignment:
   a. Elevation of slabs-on-grade - 3/4 inch.

   a. 12 inch dimension or less - plus 3/8 inch to minus 1/4 inch.
   b. Greater than 12 inch to 3 foot dimension - plus 1/2 inch to minus 3/8 inch.
   c. Greater than 3 foot dimension - plus 1 inch to minus 3/4 inch.

5. Relative alignment:
   a. Grooves:
      1) Specified width 2 inches or less - 1/8 inch.
      2) Specified width between 2 inches and 12 inches - 1/4 inch.
   b. All other conditions - 3/8 inch in 10 feet.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:


D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.
F. Provide elevation or camber in formwork as required for anticipated formwork deflections due to weight and pressures of concrete and construction loads.

G. Foundation Elements: The sides of all below grade portions of beams shall be formed straight and to the lines and grades specified. Foundation elements shall not be earth formed unless specifically indicated on the Drawings.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer’s written instructions, before placing reinforcement, anchoring devices, and embedded items.

1. Do not apply form release agent where concrete surfaces are scheduled to receive subsequent finishes which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC’s “Code of Standard Practice for Steel Buildings and Bridges.”

   a. Spacing within a bolt group: 1/8"
   b. Location of bolt group (center): 1/2"
   c. Rotation of bolt group: 5 degrees
   d. Angle off vertical: 5 degrees
   e. Bolt projection: ± 3/8"

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOUR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

B. Lap joints 6 inches and seal with tape as noted below.
   1. General sealing and at slabs on grade: Use manufacturer's standard adhesive or pressure sensitive tape for sealing membrane at seams, pipe penetrations, tears, etc.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
   1. Weld reinforcing bars according to AWS D1.4, where indicated. Only steel conforming to ASTM A706 may be welded.

D. Installation tolerances:
   1. Top and bottom bars in slabs, girders, beams and joists:
      a. Members 8" deep or less: ±3/8"
      b. Members more than 8" deep: ±1/2"
   2. Concrete Cover to Formed or Finished Surfaces: ±3/8" for members 8" deep or less; ±1/2" for members over 8" deep, except that tolerance for cover shall not exceed 1/3 of the specified cover.

E. Concrete Cover: Refer to the Structural Notes.
F. Splices: Provide standard reinforcement splices by lapping and tying ends. Comply with ACI 318 for minimum lap of spliced bars where not specified on the documents.

G. Mechanical Splices: Use for splicing of bars larger than no. 11 or where no. 11 bars are spliced to larger size bars and where indicated on the drawings. Comply with manufacturer's instructions for preparation of bars and installation procedures.

H. Field Welding of Embedded Metal Assemblies: All paint and galvanizing shall be removed in areas to receive field welds. All areas where paint or galvanizing has been removed shall be field repaired with the specified paint or cold galvanizing compound, respectively.

I. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

J. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.

3. Locate joints for beams and slabs, in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, and only if specifically noted as withheld on the batch ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
2. Water content shall not exceed the maximum specified water/cement ratio for the mix.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
4. Do not permit concrete to drop freely any distance greater than 20'-0" for concrete containing a high range water reducing admixture (superplasticizer) or 5'-0" for other concrete. Provide chute or tremie to place concrete where longer drops are necessary. Do not place concrete into excavations with standing water. If place of deposit cannot be pumped dry, pour concrete through a tremie with its outlet near the bottom of the place of deposit.
5. Pump priming grout shall be discarded and not used in the structure.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
F. Hot-Weather Placement: Comply with ACI 305.1 and as follows:

1. Maintain concrete temperature below 95 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor’s option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces at exterior locations.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

1. Housekeeping pads: Concrete fill shall be normal weight concrete (3000 psi), reinforced with 4x4-W2.1xW2.1 welded wire mesh set at middepth of pad. Trowel concrete to a dense, smooth finish. Set anchor bolts for securing mechanical or electrical equipment during pouring of concrete fill.
3.10 INSTALLATION OF NON-SHRINK GROUT UNDER BASEPLATES

A. Grout under all bearing and baseplates. Comply with manufacturer’s instructions. Do not dry pack.

B. Mixing: Use a mechanical mixer. Add only enough water to make grout placeable. Do not mix more grout than can be used in 20 minutes. Under no circumstances shall grout be retempered.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer’s written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods. At concrete slabs to receive polished finish, use moisture curing unless moisture-retaining cover curing is specifically approved; and do not use chemical curing compounds at polished slabs:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoil areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoil areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 CONCRETE SURFACE REPAIRS

A. Surface Defects in Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Owner's approval.

1. For patching of polished concrete floor slabs, refer also to Division 03, Section "Polished Concrete Floor Finishing".

B. Contractor shall submit a detailed, descriptive procedure listing proposed pre-packaged repair materials and methods for the repair of surface defects prior to the start of repair work.

C. Patching Mortar: Mix, place and finish pre-packaged repair mortar in accordance with manufacturer's instructions.

D. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, minor honeycombs and rock pockets with no exposed reinforcement, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out minor honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface, 1/4 inch deep minimum. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view using pre-packaged repair mortar so that, when dry, patching mortar will match surrounding color. Patch a test area at
inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

E. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include minor spalls, pop outs, honeycombs and rock pockets with no exposed reinforcement, crazing and cracks in excess of 0.01 inch wide that do not penetrate to reinforcement, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with patching mortar. Remove defective areas with clean, square cuts, 1/4" deep minimum. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Place, compact, and finish patching mortar to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
8. Unapproved and defective repairs shall be removed and replaced in accordance with requirements provided by the Engineer at no additional cost to the Owner.

3.13 STRUCTURAL REPAIRS

A. Structurally Defective Concrete: Structural defects include spalls, honeycombs or rock pockets with exposed reinforcement, hollow-sounding concrete, cracks that penetrate to the reinforcement or completely through concrete elements, inadequate cover over reinforcement, and other conditions that affect the structural performance or durability of the concrete as determined by the Engineer.
B. Repair structural defects in concrete in accordance with plans, specifications, details, etc. provided by the Engineer.

1. The cost of the additional services provided by the Engineer to prepare the repair documents, and to oversee the repair work shall be borne by the Contractor.

C. Unapproved and defective repairs shall be removed and replaced in accordance with requirements provided by the Engineer at no additional cost to the Owner.

3.14 CLEANUP

A. Imperfect or damaged work or any material damaged or determined to be defective before final completion and acceptance of the entire job shall be satisfactorily replaced at the Contractor's expense, and in conformity with all of the requirements of the Drawings and Specifications. Removal and replacement of concrete work shall be done in such manner as not to impair the appearance or strength of the structure in any way.

B. Cleaning: Upon completion of the work all forms, equipment, protective coverings and any rubbish resulting therefrom shall be removed from the site. After sweeping floors, wash floors with clean water. Finished concrete surfaces shall be left in a clean condition, satisfactory to the Owner.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner may engage a special inspector and/or a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections may include:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

6. Compression Test Specimens: ASTM C 31/C 31M.

   a. Cast and laboratory cure four cylinders for each composite sample.

      1) Do not transport field-cast cylinders until they have cured for a minimum of 24 hours.


   a. Test one cylinder at 7 days
   b. Test two cylinders at 28 days
   c. Test one cylinder at 56 days
   d. If 4" by 8" cylinders are used, provide 1 additional cylinder at each stage

8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

   a. When the strength level of the concrete for any portion of the structure, as indicated by cylinder tests, falls below the specified requirements, the Contractor shall provide improved curing conditions and/or adjustments to
the mix design as required to obtain the required strength. If the average strength of the laboratory control cylinders falls so low as to be deemed unacceptable, the Contractor shall follow the core test procedure set forth in ACI 301, Section 1.6. Locations of core tests shall be approved by the Architect. Core sampling and testing shall be at Contractors expense.

b. If the results of the core tests indicate that the strength of the structure is inadequate, any replacement, load testing, or strengthening as may be ordered by the Architect shall be provided by the Contractor without cost to the Owner.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 03 30 00
SECTION 03 35 11 - CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Surface treatments for concrete floors and slabs.

1.2 ADMINISTRATIVE REQUIREMENTS
A. Coordinate the work with concrete floor placement and concrete floor curing.

1.3 SUBMITTALS
A. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
B. Provide separate sample.

1.4 FIELD CONDITIONS
A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
B. Do not finish floors until interior hvac system is operational.

PART 2 PRODUCTS

2.1 CONCRETE FLOOR FINISH APPLICATIONS
A. Unless otherwise indicated, all exposed concrete floors are to be finished using liquid densifier/hardener.
B. Liquid Densifier/Hardener:
C. Penetrating Clear Sealer:
   1. Use at following locations: as noted on finish schedule in drawings.

2.2 DENSIFIERS AND HARDENERS
A. Liquid Densifier/Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete after set.
   1. Composition: Sodium silicate.

2.3 COATINGS
A. Pentrating Clear Sealer: Transparent, non-yellowing, water- or solvent-based coating.
   2. Nonvolatile Content: 15 percent, minimum, when measured by volume.
   3. Products:
      a. LS Guard
   4. Note: Seal-1 No extra aesthetic protections required, finish preference: none
      a. Seal-2: Protect from damage and stains prior to sealing. Finish: Matte

B. PART 3 EXECUTION
3.1 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.2 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

3.3 COATING APPLICATION

A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.

C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

E. FULLY PROTECT FINISH SURFACE as required and as recommended by manufacturer.

END OF SECTION
SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Structural steel framing members and connections.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC’s "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.

2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural analysis data for structural-steel connections.

B. Construction: Type PR, partially restrained.

1.5 SUBMITTALS

Submittals for Review

1. Provide complete details and schedules for fabrication and shop assembly of members, erection plans, details, procedures, and diagrams showing sequence of erection of structural steel components.

a. Include details of cuts, connections, splices, camber, holes, and other pertinent data.

b. Include embedment drawings.
c. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
d. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.

2. Shop drawings and erection drawings shall not be made by using reproductions of Contract Drawings.

3. Structural steel members for which shop drawings have not been reviewed shall not be fabricated. Engineer's review shall cover general locations, spacings, and details of design. Omission from shop drawings of any materials required by the Contract Documents shall not relieve the Contractor of the responsibility of furnishing and installing such materials, even though such shop drawings may have been reviewed and returned.

B. Submittals for Information:

1. Product Data: For each type of product indicated.
2. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Connection Calculations: Contractor shall design all connections not specifically detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Texas. Submit design calculations for the connections designed by the contractor, prior to or with the steel shop drawings. Shop drawings containing connections for which calculations have not been received shall be returned unchecked as an incomplete submittal. Calculations shall be retained for the Engineer's file and will not be approved or returned.
   a. Connections shall be designed in accordance with the requirements specified in the Structural Drawings and Specifications.
   b. Beam connections: Submit a complete calculation for each different beam connection used and detailed on the shop drawings. Conditions which are similar may be grouped together so as to utilize a single connection design.
   c. Submit complete connection calculations for wind brace connections, truss connections, moment connections and other connections where specified on the Contract Drawings. Each calculation shall identify the location or locations for which the connection applies, the member mark(s) from the Contract Documents, the piece mark(s) from the shop drawings, the member size, the design loading(s), member size, and the end of the member to which the connection applies.
   d. The unit of measurement for the connection calculations must follow the United States customary system (USCS).
5. Qualification Data: For Installer, fabricator, and testing agency.
6. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
   a. Structural steel including chemical and physical properties.
b. Bolts, nuts, and washers including mechanical properties and chemical analysis.
c. Shear stud connectors.
d. Shop primers.
e. Nonshrink grout.

7. Source quality-control test reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

B. Fabricator Qualifications: Company specializing in performing the work of this section with minimum 10 years of documented experience.

C. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category SBD at the time of bid.

D. Fabricator Qualifications: A qualified fabricator that participates in a nationally accepted inspections program acceptable to the registered design professional in responsible charge.

E. Fabricator Qualifications: The special inspector shall verify that the fabricator maintains detailed fabrication and quality control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards. The special inspector shall review the procedures for completeness and adequacy relative to the code requirements for the fabricators scope of work.

1. Exception: Special inspections shall not be required where the work is done on the premises of a fabricator that is enrolled in a nationally accepted inspections program acceptable to the registered design professional in responsible charge. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to building official upon request and to the registered design professional in responsible charge stating that the work was performed in accordance with the approved construction documents.

F. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

G. The latest adopted edition of all standards referenced in this Section shall apply unless noted otherwise. In case of conflict between these Contract Documents and the referenced standard, the Contract Documents shall govern. In case of conflict between these Contract Documents and the Building Code, the more stringent shall govern.

H. The Contractor shall furnish fabrication and erection inspection and testing of all welds in accordance with AWS D1.1, Chapter 6. Submit records of inspections and tests to the Owner's testing laboratory for their review. The fabrication and erection inspectors shall be AWS certified welding inspectors.
I. All materials, fabrication procedures and field erection are subject to verification inspection and testing by the Owner's testing laboratory in both the shop and field. Such inspections and tests will not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with specified requirements.

J. Qualifications for Welding Work: Contractor shall be responsible for qualifying welding operators in accordance with the AWS "Standard Qualification Procedure." Provide certification to Owner's testing laboratory that welders to be employed in the work have satisfactorily passed AWS qualification tests. Recertification of welders shall be Contractor's responsibility.

K. Qualification of Welding Procedures: Contractor shall provide the testing laboratory with welding procedures which are to be used. Welding procedures shall be qualified prior to use in accordance with AWS D1.1, Part B.

L. Comply with applicable provisions of the following specifications and documents:
   1. AISC's "Code of Standard Practice for Steel Buildings and Bridges"
   2. AISC's "Specification for Structural Steel Buildings."
   3. ASTM A6 "Specifications for General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
   4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
   5. RCSC's "Specification for Structural Joints Using High Strength Bolts."
   6. AWS D1.1 "Structural Welding Code"

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

   1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
   2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Plate and Bar: ASTM A 36.
B. Steel Pipe: ASTM A 53, Type E, Grade B.
   1. Weight Class: As indicated.
   2. Finish: Black, except where indicated to be galvanized.

C. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM F3125, grade A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
   1. Finish: Plain.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

D. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
   5. Finish: Plain.

   3. Finish: Plain.

F. Adhesive Anchors:
   1. In concrete:
      a. HIT RE 500V3-Safe Set System, Hilti Inc.
      b. SET-XP epoxy, Simpson Strong-Tie, Inc.
      c. HIT-HY 200 Safe Set System, Hilti, Inc.
      d. AT-XP acrylic, Simpson Strong-Tie Company, Inc.

2.3 PRIMER

A. Primer: Fabricator’s standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

B. Galvanizing Repair Paint: ASTM A 780.
C. Cold Galvanizing Compound shall be "ZRC" cold galvanizing compound as manufactured by ZRC Worldwide, Marshfield, Massachusetts.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, Grade B, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time, capable of developing a minimum compressive strength of 5,000 psi at 28 days.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges", AISC's "Specification for Structural Steel Buildings", and as indicated on accepted shop drawings.

1. Camber structural-steel members where indicated.
2. Mill tolerances shall conform to ASTM A6. Identify high-strength structural steel according to ASTM A 6 and maintain markings until structural steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Plates shall be free of gross discontinuities such as ruptures and delaminations. Plates shall comply with ASTM A578, Level 1.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads. Members in compression joints which depend on contact bearing shall have the bearing surfaces milled to a common plane. Members to be milled shall be completely assembled before milling.

E. Base Plates: Oversize anchor bolt holes in base plates to facilitate erection as specified in Table 14-2 in AISC 360-10.

F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning, SSPC-SP 2, "Hand Tool Cleaning, or SSPC-SP 3, "Power Tool Cleaning."

G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
H. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM F3125, grade A 325 or grade A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.
2. Provide washers over all slotted holes in an outer ply.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work. Welds not specified shall be continuous fillet welds designed to develop the full strength of the member. A combination of welds and bolts shall not be used to transmit stress at the same face of any connections. Clean completed welds prior to inspection. Slag shall be removed from all completed welds.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
5. Top surfaces of beams which support composite metal floor deck.
6. Headed shear studs, although overspray is acceptable.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry
film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 **GALVANIZING**

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.

   1. Fill vent holes and grind smooth after galvanizing.

B. Galvanizing: The following steel shall be hot-dip galvanized (including any associated fasteners):

   1. Lintels and shelf angles attached to structural-steel frame and located in exterior walls.
   2. Railing exposed to weather.

2.9 **SOURCE QUALITY CONTROL**

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM F3125, grade A 325 or grade A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:

   1. Liquid Penetrant Inspection: ASTM E 165.
   2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   4. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

   1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Design of temporary bracing and supports shall be the responsibility of the Contractor. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings—Allowable Stress Design and Plastic Design," unless closer tolerances are required for proper fitting of adjoining or enclosing materials, in which case the more stringent shall apply.


1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
5. Grout under baseplates in accordance with Section 033000.


D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that
will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated. Any member having a splice not shown and detailed on the accepted shop drawings shall be rejected.

F. Do not field cut or alter structural members without approval of Architect/Engineer. Do not use thermal cutting during erection unless approved by Architect/Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1.

G. Gas Cutting: Do not use gas cutting torches in the field to correct fabrication errors in structural framing.

H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer’s written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC’s "Specification for Structural Joints Using ASTM F3125, grade A 325 or grade A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

2. A307 bolts and high-strength (ASTM F3125, grade A325 and grade A490) bolts noted to be "snug-tight" shall be tightened using a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench, bringing the plies into contact.

3. High-strength bolts which are not specifically designated to be "snug-tight" shall be tightened to provide at least the minimum tension shown in Table 4 of the "Specification for Structural Joints using ASTM F3125, grade A325 and grade A490 Bolts." Tightening shall be done by the turn-of-the-nut method, with direct tension indicators, or by properly calibrated wrenches.

4. Bolts tightened with a calibrated wrench or by torque control shall have a hardened washer under the element (nut or bolt head) turned in tightening.

5. Hardened washers shall be placed over slotted holes in an outer ply. Hardened beveled washers shall be used where the outer face of the bolted parts has a slope greater than 1:20 with respect to the bolt axis.
B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work. Welds not specified shall be continuous fillet welds designed to develop the full strength of the member. A combination of welds and bolts shall not be used to transmit stress at the same face of any connections. Clean completed welds prior to inspection. Slag shall be removed from all completed welds.


3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM F3125, grade A 325 or grade A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:

   a. Liquid Penetrant Inspection: ASTM E 165.
   b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   c. Ultrasonic Inspection: ASTM E 164.
   d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
B. Touch-up Cold Galvanizing: Touch up areas of hot dip galvanized members where galvanizing has been abraded during shipping and erection and areas where galvanizing has been removed or damaged due to welding. Apply cold galvanizing compound in accordance with the manufacturer's instructions to a minimum dry film thickness of 2.0 mils.

END OF SECTION 05 12 00
SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This section applies to the Daughtrey Education Center, Chaparral Bunkhouses, and Chaparral Residences.

1.2 SUMMARY

A. Section Includes:

   1. Framing with dimension lumber.
   2. Wood blocking and nailers.

B. Related Requirements:

   1. Division 06 Section "Sheathing."
   2. Division 02 Section "Termite Control" for site application of borate treatment to wood framing.

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:

   1. NLGA: National Lumber Grades Authority.
   2. SPIB: The Southern Pine Inspection Bureau.
   3. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 [for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground].

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
3. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:

1. Concealed blocking.
2. Framing for non-load-bearing partitions.
3. Framing for non-load-bearing exterior walls.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction or No. 2.

1. Application: All interior partitions.
2. Species:
   a. Hem-fir (north); NLGA.
   b. Mixed southern pine; SPIB.
   c. Spruce-pine-fir; NLGA.
   d. Hem-fir; WCLIB, or WWPA.
   e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
   f. Western woods; WCLIB or WWPA.

B. Load-Bearing Partitions: No. 2 grade.

2. Species:
   a. Douglas Fir-Larch, WWPA.
   b. Southern Pine, SPIB

C. Ceiling Joists: Construction, Standard or No. 2 grade.

1. Species:
   a. Douglas Fir-Larch, WWPA.
b. Southern Pine, SPIB
   c. Spruce-pine-fir; NLGA.

D. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.

   1. Species:
      a. Hem-fir (north); NLGA.
      b. Southern Pine, SPIB

E. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

   1. Application: Exposed exterior and interior framing indicated to receive a stained or natural finish.
   2. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

   1. Blocking.
   2. Nailers.
   3. Furring.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

C. For utility shelving, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

   1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
   2. Mixed southern pine; No. 1 grade; SPIB.
   3. Hem-fir or hem-fir (north); Select Merchantable or No. 1 Common grade; NLGA, WCLIB, or WWPA.
   4. Spruce-pine-fir (south) or spruce-pine-fir; Select Merchantable or No. 1 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.


D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

2.7 METAL FRAMING ANCHORS

A. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.


1. Use for interior locations unless otherwise indicated.

C. Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.

D. I-Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.

E. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
F. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.

G. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

H. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

I. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick.

J. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

K. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.

L. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.

M. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.

N. Wall Bracing: Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch thick with hemmed edges.

2.8 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

D. Do not splice structural members between supports unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated.

G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.

J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
   1. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

3.3 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs. Fasten plates to supporting construction unless otherwise indicated.

1. For exterior walls, provide wood studs spaced 16 inches o.c. unless otherwise indicated.
2. For interior partitions and walls, provide 16 inches o.c. unless otherwise indicated.
3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.

B. Construct corners and intersections with three or more studs.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.

D. Provide bracing in walls, at locations indicated.

3.4 CEILING JOIST AND RAFTER FRAMING INSTALLATION

A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.

B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

END OF SECTION 06 10 00
SECTION 06 16 00 - WOOD SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Wall sheathing.
   2. Roof sheathing.

B. Related Requirements:
   1. Section 061000 "Rough Carpentry" for plywood backing panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product, indicate component materials and dimensions and include construction and application details.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

C. Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

A. Plywood Wall Sheathing: Includes products that carry an approval by the American Plywood Associations (APA Rating)

1. Nominal Thickness: As indicated on Drawings

2.3 ROOF SHEATHING

A. Plywood Roof Sheathing: Includes products that carry an approval by the American Plywood Associations (APA Rating)

1. Nominal Thickness: As indicated on Drawings.

2.4 SUBFLOORING

A. Plywood Subflooring: Tongue and Groove. Includes products that carry an approval by the American Plywood Associations (APA Rating).

1. Nominal Thickness: As indicated on drawings.

2.5 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 or ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION


B. Fastening Methods: Fasten panels as indicated below:

1. Subflooring:
   a. Glue and nail to wood framing.
   b. Space panels 1/8 inch apart at edges and ends.

2. Wall and Roof Sheathing:
   a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
   b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 06 16 00
SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Interior trim.
   2. Shelving.
   3. Custom Closet Unit.
   5. Wood Bench.

B. Related Requirements:
   1. Division 06 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
   2. Division 09 "Interior Painting" for finishes
   3. Division 09 "Staining and Transparent Finishing"

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
   1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and the following grading rules:
   3. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

B. Softwood Plywood: DOC PS 1.

C. Hardboard: AHA A135.4.

D. All Interior finishes to be NFPA 101 Class A

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.
   1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent respectively.
   2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
   3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
   4. Do not use material that is warped or does not comply with requirements for untreated material.
   5. Mark lumber with treatment-quality mark of an inspection agency approved by the American Lumber Standard Committee's Board of Review.
      a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

2.3 INTERIOR TRIM

A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
   1. Species and Grade: As indicated on drawings.
   2. Maximum Moisture Content: 15 percent.

B. Lumber Trim for Opaque Finish (Painted Finish):
   1. Species and Grade: As indicated on drawings.
   2. Maximum Moisture Content: 15 percent.

C. Softwood Moldings for Transparent Finish (Stain or Clear Finish): WMMPA WM 4, N-grade wood moldings. Made to patterns included in WMMPA WM 12.
   1. Species and Grade: As indicated on drawings.
   2. Maximum Moisture Content: 15 percent.

2.4 SHELVING

A. Shelving: Made from the following material, 1/2 inch thick.
   1. MDO softwood plywood with solid-wood edge.
B. Shelf Cleats: 3/4-by-5-1/2-inch boards with hole and notch to receive clothes rods, as specified above.

C. Adjustable Shelf Brackets: BHMA A156.9, B04112.

D. Standards for Adjustable Shelf Supports: BHMA A156.9, B04071.

E. Adjustable Shelf Supports: BHMA A156.9, B04081 or B04091.

F. Clothes Rods: Stainless steel.

2.5 BENCH

A. Species: Birch.

B. Thickness:

C. Cut: Rotary.

D. Factory Finish:

E. Stain to match architects sample with lacquer or class A FR Varnish topcoat.

F. All finishes shall be selected by the designer, architect, or designated owner’s representative.

G. Provide sample finished sample for Owner and Architect approval

2.6 CUSTOM CLOSET UNIT

A. Species: Birch

B. Thickness: 3/4"

C. Cut: Rotary.

D. Factory Finish:

E. Stain to match architects sample with lacquer or class A FR Varnish topcoat.

F. All finishes shall be selected by the designer, architect, or designated owner’s representative.

G. Provide sample finished sample for Owner and Architect approval.

2.7 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
   1. Wood glue shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Paneling Adhesive: Comply with paneling manufacturer’s written recommendations for adhesives.
   1. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
   1. Adhesive shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer and Architect present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Lay out work with Architect on site and obtain approval of the Architect prior to proceeding with fabrication.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours [unless longer conditioning is recommended by manufacturer].

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
   1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
   2. Where face fastening is unavoidable, prepare full-size template for fastener placement and obtain approval of Architect of fastener pattern.
   3. Where directed, countersink exposed fasteners, fill surface flush, and sand unless otherwise indicated.
   4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
   5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

3.5 PANELING INSTALLATION

A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings. Install with uniform tight joints between panels.
1. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners.
2. Exposed fasteners:
   a. Where exposed fasteners are indicated on drawings, prepare a template for the fastener pattern for the typical panels with exposed fasteners. Space fasteners as recommended by panel manufacturer.
   b. Install panels with fasteners exposed, butt jointed.
   c. Use stainless steel fasteners for all exposed applications.
3. Concealed fasteners:
   a. Space fasteners and adhesive as recommended by panel manufacturer.
   b. Install panels with small headed finish nails.
   c. Fill and sand nail holes and prepare for finish.

3.6 SHELVING AND CLOTHES ROD INSTALLATION
A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.
B. Install shelf cleats by fastening to framing or back ing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches o.c. Use 2 fasteners at each framing member or fastener location for cleats 4 inches nominal in width and wider.
C. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
D. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches o.c.
E. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. and within 6 inches of end of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
F. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.
   1. Fasten shelves to cleats with finish nails or trim screws, set flush.
   2. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.
G. Install rod flanges for rods as indicated. Fasten to shelf cleats, framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Install rods in rod flanges.

3.7 ADJUSTING
A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.8 CLEANING
A. Clean interior finish carpentry on exposed and semi-exposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.
3.9 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
   1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION
SECTION 06 41 13 - ARCHITECTURAL WOOD CABINETS

GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Architectural wood cabinets.
   2. Wood furring, blocking, shims, and hanging strips for installing architectural wood cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:
   1. Section 06 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products, cabinet hardware and accessories and finishing.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples for Initial Selection:
   1. Shop-applied transparent finishes.

D. Samples for Verification:
   1. Cabinet face with transparent finish, not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature
between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood-veneer-faced architectural cabinets can be supported and installed as indicated.

PRODUCTS

1.8 ARCHITECTURAL CABINET FABRICATORS

A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of architectural wood cabinets with sequence-matched wood veneers.

B. Fabricators: Subject to compliance with requirements, provide products by the following:
   Basis of Design:
   a. Core: With “All Plywood Construction”.
   b. Style: Thomasville Costello Collection-Home Depot
   c. Style: Shaker- Square Raised Panel
   d. Wood Species: Maple
   e. Finish: Stain similar to Trestle

1.9 ARCHITECTURAL WOOD CABINETS, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the “Architectural Woodwork Standards” for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.

1.10 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Cabinet and Door and Drawer Front Interface Style: Partial Overlay.

1.11 CABINET HARDWARE AND ACCESSORIES

A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602.

B. Pulls: Manufacturer: Sugatsune H-42-C,304 Stainless Steel 6”.

C. Shelf Rests: BHMA A156.9, B04013; metal.

D. Drawer Slides: Manufacturer’s standard.

E. Finish: Satin Nickel
1.12 MISCELLANEOUS MATERIALS
A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber kiln dried to less than 15 percent moisture content.
B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

1.13 FABRICATION
A. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
   1. Corners of Cabinets: 1/16 inch unless otherwise indicated.
B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1.14 SHOP FINISHING
A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

EXECUTION
1.15 PREPARATION
A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

1.16 INSTALLATION
A. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
B. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.
   1. For shop finished items use filler matching finish of items being installed.
E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

F. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

1.17 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semi exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 41 13
SECTION 06 61 19 – QUARTZ SURFACING FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the contract, including general and supplementary conditions and apply to this Section.

1.2 SUMMARY
   A. This Section includes the following horizontal and trim quartz surface product types at:
      1. Countertop
      2. Backsplash and sidesplash
   B. Related Sections include the following:
      1. Division 06 Section "Rough Carpentry" for Blocking.

1.3 SUBMITTALS
   A. Product data:
      1. For each type of product indicated.
   B. Shop drawings:
      1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
         a. Show the following:
            1) Full-size details, edge details, attachments, etc.
            2) Locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
            3) Locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in quartz surface.
            4) Seam locations.
   C. Samples:
      1. For each type of product indicated:
         a. Submit minimum 6-inch by 6-inch sample in specified color.
      2. Approved samples will be retained as a standard for work.
   D. Product data:
      1. Indicate product description, fabrication information and compliance with specified performance requirements.
   E. Product certificates:
      1. For each type of product, signed by product manufacturer.
   F. Fabricator/installer qualifications:
      1. Provide copy of certification number.
   G. Manufacturer certificates:
      1. Signed by manufacturers certifying that they comply with requirements.
   H. Maintenance data:
      1. Submit manufacturer's care and maintenance data.
         a. Maintenance kit for finishes shall be submitted.
      2. Include in project closeout documents.

1.4 QUALITY ASSURANCE
   A. Qualifications:
1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:
   1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

C. Applicable standards:
   1. Standards of the following, as referenced herein:
      a. American National Standards Institute (ANSI)
      b. American Society for Testing and Materials (ASTM)
      c. National Electrical Manufacturers Association (NEMA)
      d. NSF International
   2. Fire test response characteristics:
      a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E 84) or another testing and inspecting agency acceptable to authorities having jurisdiction.
      b. Flame Spread Index: 25 or less.
      c. Smoke Developed Index: 450 or less.

D. Allowable tolerances:
   1. Variation in component size: ±1/8" (3 mm) over a 10' length.
   2. Location of openings: ±1/8" (3 mm) from indicated location.
   3. Maximum 1/8" (3 mm) clearance between quartz surfaces and each wall, completed units of work.

1.5 DELIVERY, STORAGE AND HANDLING
   A. Deliver no components to project site until areas are ready for installation.
   B. Store components indoors prior to installation.
   C. Handle materials to prevent damage to finished surfaces.
      1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.6 WARRANTY
   A. Provide manufacturer’s 10-year warranty against defects in materials.
      1. Warranty shall provide material to repair or replace defective materials.
      2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

1.7 MAINTENANCE
   A. Provide maintenance requirements as specified by the manufacturer.

PART 2 — PRODUCTS

2.1 MANUFACTURERS
   A. Subject to compliance with the requirements, provide the following product:
      2. Viatera
      3. Zodiaq® quartz surfaces from DuPont
      4. Wilsonart
2.2 MATERIALS

A. Material:
1. Homogeneous quartz surfaces material.
2. Material shall have minimum physical and performance properties specified.
3. Color: Basis of Design- Crema Minerva

B. Thickness:
1. 2 cm (3/4").

C. Edge treatment:
1. Basic Eased Edge

D. Seam width:
1. <1/8" unless otherwise specified.

E. Backsplash & Sidesplash:
1. Provide a 6" high splash with same thickness as countertop or recommended by fabricator.

F. All Interior finishes to be NFPA 101 Class A

G. Performance characteristics: Zodiaq® physical properties data sheet:

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<thead>
<tr>
<th>Property</th>
<th>Typical Result</th>
<th>Test Procedure</th>
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<tr>
<td>Flexural Strength</td>
<td>&gt;5,300 psi</td>
<td>ASTM D 790</td>
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<td>Flexural Modulus</td>
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<td>Flexural Elongation</td>
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<td>Boiling Water Resistance</td>
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Toxicity Passes, LC50=68–128 Pittsburgh Protocol
Flammability For all colors tested ASTM E 84, UL 723
(Class I and Class A) and NFPA 255
Flame Spread Index FSI <10 for 3 cm and <15 for 2 cm
Smoke Developed Index SDI <50 for 3 cm and <100 for 2 cm
Nominal Thickness 2 cm and 3 cm
Nominal Weight 10 lb./ft.2 (2 cm)
15 lb./ft.2 (3 cm)

* NEMA results based on the NEMA LD 3-2000

2.3 ACCESSORY PRODUCTS
A. Joint adhesive:
   1. DuPont-approved adhesive to create color-matched seam.

2.4 FACTORY FABRICATION
A. Shop assembly
   1. Fabricate components to greatest extent practical to sizes and shapes indicated, in
      accordance with approved shop drawings and manufacturer’s printed instructions and
      technical bulletins.
   2. Form joints between components using manufacturer’s standard joint adhesive joints.
      a. Reinforce as required.
   3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the
      drawings.
   4. Rout and finish component edges with clean, sharp returns.
      a. Rout cutouts, radii and contours to template.
      b. Smooth edges.

PART 3 — EXECUTION

3.1 INSTALLATION
A. Install components plumb and level, in accordance with approved shop drawings and
   product installation details.
   1. Tops:
      a. Flat and true to within 1⁄8” (3 mm) of a flat surface over a 10’ length.
      b. Allow a min. 1⁄16” to a max. of 1⁄8” clearance between surface and each wall.
   B. Form field joints using manufacturer’s recommended adhesive, with joint widths no greater
      than 1⁄8” (3 mm) in finished work.
      1. Keep components and hands clean when making joints.
   C. Keep components and hands clean during installation.
      1. Remove adhesives, sealants and other stains.
      2. Components shall be clean on date of substantial completion.

3.2 CLEANING AND PROTECTION
A. Keep components clean during installation.
   1. Remove adhesives, sealants and other stains.
B. Protect surfaces from damage until date of substantial completion.
   1. Replace damaged work.

END OF SECTION
SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This Section applies to the following:
   a. At roof deck – R25 closed cell sprayed on insulation.
   b. At roof deck – R12 Polyiso insulation board.
   c. At exterior and interior cavity wall in batt form insulation.

1.2 SUMMARY

A. Section Includes:
   1. Glass-fiber board insulation.
   2. Glass-fiber blanket insulation.
   3. Rigid roof insulation.
   5. Blown-in Insulation

B. Related Sections:
   1. Division 06 "Rough Carpentry" for insulation installed in exterior 2x walls and interior demising walls.
   2. Division 07 “Standing Seam Metal Roof Panels”.

1.3 DEFINITIONS

A. Thermal Resistivity (r-value): Where thermal resistivity properties of insulation materials are designated by "r-values" they represent the reciprocal of thermal conductivity (k-values). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between the two exposed faces required to cause on BTU to flow through one square foot per hour at mean temperatures indicated.

B. Thermal Resistance (R-value) is the reciprocal of thermal conductance (C-value) which is the rate of heat flow through a material of the thickness indicated. Thermal resistance (R-value) is expressed by the temperature difference in degrees F (Kelvins) between the two exposed faces required to cause 1 Btu to flow through 1 sq. ft. (1 watt to flow through 1 sq. m) per hour at the mean temperature indicated.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. For each type of insulation product indicated
   2. Anchor product data for each insulation type and substrate.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BOARD INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. CertainTeed Corporation.
   2. Johns Manville.
   4. Owens Corning.

B. Unfaced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA; ASTM C 553, Types I, II, and III; or ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84, passing ASTM E 136 for combustion characteristics.
   1. Nominal density of not less than 1.5 lb/cu. ft. or more than 1.7 lb/cu. ft., thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.

C. Sustainability Requirements: Provide glass-fiber board insulation as follows:
   1. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. CertainTeed Corporation.
   2. Guardian Building Products, Inc.
   5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
   1. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.3 GLASS FIBER INSULATION FASTENERS

A. Anchor insulation to substrates with anchors and/or adhesives as recommended by the insulation manufacturer for that substrate.
2.4 ROOF INSULATION

A. General: Preformed roof insulation boards approved by roofing panel manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
   1. Polyiso Insulation:
      a. ASTM E84 Flame Spread Index of 45-50
      b. ASTM E84 Smoke Developed Index of 105-450
      c. Moisture Vapor Permeance per ASTM E96 of less than 1.5 perms.

2.5 SPRAY FOAM INSULATION

A. Closed-cell medium density spray foam insulation at underside of roof deck.

B. Basis of Design: Pro-Seal (MD-C-200v3) by ICYNENE, or approved equal.
   1. Closed Cell medium density spray foam.
   2. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.
   3. Thermal Resistance Rating:

2.6 MINERAL WOOL BLANKETS

A. Mineral-Wool Blanket, Unfaced: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.7 BLOWN-IN INSULATION

A. Basis of Design: AttiCAT Expanding Blown-in PINK FIBERGLAS by Owens Corning.

B. Thermal resistance of R-38.

2.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
   1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.

D. Wood Nailer Strips: Comply with requirements in Section 061000 "Rough Carpentry."

E. Substrate Joint Tape: 6- or 8-inch-wide, coated, glass fiber.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.
3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

C. Mineral Wool Blanket Insulation: Install in cavities formed by framing members where required for acoustical treatment as indicated on drawings according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

3.4 ROOF INSULATION INSTALLATION

A. Install one lapped base-sheet course and mechanically fasten to substrate according to roofing manufacturer's written instructions.

B. Coordinate roof insulation installation with standing seam roofing cleats and/or nailing.

C. Install insulation with long joints of insulation in a continuous straight line, with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
   1. Cut and fit insulation within 1/4 inch, projections, and penetrations.
D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
   1. Where installing composite and noncomposite board insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
   1. Fasten insulation according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
   2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

3.5 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION
SECTION 07 25 00 - WEATHER BARRIER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and
      Supplementary Conditions and Division 01 Specification Sections, apply to this
      Section.

1.2 SUMMARY
   A. Section Includes:
      1. Building wrap.
      2. Flexible flashing.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. For building wrap, include data on air and water-vapor permeance based on
         testing according to referenced standards.

1.4 INFORMATIONAL SUBMITTALS
   A. Evaluation Reports: For water-resistant barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER
   A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-
      developed indexes of less than 25 and 450, respectively, when tested according to
      ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
      1. Basis-of-Design Product: Tyvek CommercialWrap made by DuPont Protection
            a. Comparable products - compliant with requirements of this Section and
               Drawings - may be submitted for Architect's consideration.
      2. Performance Characteristics:
         a. Air Penetration: 0.001 cfm/ft² at 75 Pa, when tested in accordance with
            ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft² at 75 Pa, when
            tested in accordance with ASTM E2357.
         b. Water Vapor Transmission: 28 perms, when tested in accordance with
            ASTM E96, Method B.
         c. Water Penetration Resistance: Minimum 280 cm when tested in
            accordance with AATCC Test Method 127.
         d. Basis Weight: Minimum 2.7 oz/yd², when tested in accordance with TAPPI
            Test Method T-410.
         e. Air Resistance: Air infiltration at >1500 seconds, when tested in
            accordance with TAPPI Test Method T-460.
         f. Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with
            ASTM D882, Method A.
         g. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
         h. Surface Burning Characteristics: Class A, when tested in accordance with
            ASTM E84. Flame Spread: 10, Smoke Developed: 10.
B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 FLEXIBLE FLASHING

A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

   a. Comparable product - compliant with requirements of this Section and compatible with building wrap product - may be submitted for Architect's consideration.

2. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

B. Primer for Flexible Flashing: Product recommended in writing by flexible flashing manufacturer for substrate.

C. Nails and Staples: Product recommended in writing by flexible flashing manufacturer and complying with ASTM F 1667.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

B. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistant barrier at bottom and sides of openings.
4. Lap water-resistant barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.
SECTION 07 41 13 – STANDING SEAM METAL ROOF PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes standing-seam metal roof panels.

B. Related Sections:
   1. Division 07 Section "Thermal Insulation" for rigid insulation under roofing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.
1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including rupturing, cracking, or puncturing.
      b. Deterioration of metals and other materials beyond normal weathering.
   2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
   2. Deflection Limits: For wind loads, no greater than 1/240 of the span.

B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:

C. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

E. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
   1. Fire/Windstorm Classification: Class 1A-90.
   2. Hail Resistance: SH.
F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
   1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide MBCI SuperLok, comparable product by one of the following:
      a. Advanced Architectural Products.
      b. AEP Span, a BlueScope Steel company.
      c. Architectural Building Components.
      d. Architectural Metal Systems, a Nucor company.
      e. Garland Company, Inc. (The)
      f. IMETCO.
      g. McElroy Metal, Inc.
      h. Merchant & Evans.
      i. Metal-Fab Manufacturing, LLC.
      j. Metal Sales Manufacturing Corporation.
      k. Morin, a Kingspan Group company.
      l. Ultra Seam, Inc.
      m. Union Corrugating Company.
   2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
      b. Exterior Finish: MBCI "Signature 300."
      c. Color: To be selected from full range of manufacturer's products.
   3. Clips: One-piece fixed to accommodate thermal movement.
   5. Panel Height: 2 inch.
   6. Joint Type: Double folded.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant,
polylethene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

B. Type II (No. 30)

C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
   2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
   3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide a finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.

E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot-long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.

F. Panel Fasteners: Self-tapping screws designed to withstand design loads.

G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
   1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.


2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.

3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

4. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

D. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621.

   1. Basis of Design: MBCI, Signature 300.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
   1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
   2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches Roll laps with roller. Cover underlayment within 14 days.
   1. Apply over plywood substrate, only.

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Shim or otherwise plumb substrates receiving metal panels.
   2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
   3. Install screw fasteners in predrilled holes.
   4. Locate and space fastenings in uniform vertical and horizontal alignment.
   5. Install flashing and trim as metal panel work proceeds.
   6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer’s approved fasteners according to manufacturers’ written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer’s written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
4. Watertight Installation:
   a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
   b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
   c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer’s written installation instructions, and SMACNA’s "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer’s standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
   1. Provide elbows at base of downspouts to direct water away from building.
   2. Connect downspouts to underground drainage system indicated.

J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer’s Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor’s expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer’s written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION
SECTION 07 46 46 - FIBER CEMENT PANELS

GENERAL

1.1 SECTION INCLUDES

A. Fiber cement, panels and accessories.
   1. Soffit, vented
   2. Fascia

1.2 RELATED SECTIONS

A. Section 06 "Wood and Plastics"
B. Section 06 "Rough Carpentry" - Sheathing.
C. Section 07 "Insulation: Exterior wall insulation."
D. Section 09 "Exterior Paint"

1.3 REFERENCES

B. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: Provide detailed drawings of a typical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns. For Owner and Architect to approve.

D. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 years' experience with installation of similar products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Product Warranty: Limited, non-pro-rated product warranty.
   1. 30 years.

B. Finish Warranty: Limited product warranty against manufacturing finish defects.
   1. When used for its intended purpose, properly installed and maintained according to published installation instructions, for a period of 15 years from the date of purchase: will not peel; will not crack; and will not chip. Finish warranty includes the coverage for labor and material.

C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Basis of Design: James Hardie Building Products, Inc., which is located at: 26300 La Alameda Suite 400 ; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Fax: 949-367-4981; Email: request info (info@jameshardie.com)

B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 016000.

2.2 SOFFIT, FASCIA, & WALL BASE

A. Soffit: HardieSoffit vented Cedarmill as manufactured by James Hardie Building Products, Inc.
   1. Type: Cedarmill horizontal soffit panel, ¼ inch thick, 4 feet wide by 8 feet long.

B. Fascia:
   1. HardieTrim Boards 4/4 Rustic as manufactured by James Hardie Building Products, Inc.
      a. Product: 2-1/2 inch (63 mm) width.
      b. Texture: Rustic
      c. Length: 12 feet (3657.6 mm).
      d. Thickness: 3/4 inch (19 mm).

2.3 FASTENERS

A. Wood Framing Fasteners:
   1. Wood Framing: common corrosion resistant nails size per manufacturers recommendation.

2.4 FINISHES

A. Factory Primer: Provide factory applied universal primer.
   2. Topcoat: Refer to Section 09 "Exterior Paint".
B. Factory Finish: To be selected from Standard manufacture selections by Architect during the submittal process.
   Product: ColorPlus Technology by James Hardie.
   2. Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
   3. Process:
      a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
      b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photo spectrometer and verified by third party.
   4. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
   5. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.

C. Factory Finish Color for Trim, Soffit, Wall Base & Fascia: to be determined by Architect, from standard selection

D. All Interior finishes to be NFPA 101 Class A

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
C. Nominal 2 inch by 4 inch (51 mm by 102 mm) wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistant barriers or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
   1. Install water-resistant barriers and claddings to dry surfaces.
   2. Repair any punctures or tears in the water-resistant barrier prior to the installation of the siding.
   3. Protect siding from other trades.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
C. Install a water-resistant barrier is required in accordance with local building code requirements.
D. The water-resistant barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.
E. Install Engineered for ClimateTM HardieWrapTM weather barrier in accordance with local building code requirements.
F. Use HardieWrapTM Seam Tape and joint and laps.
G. Install and HardieWrap™ flashing, HardieWrap™ Flex Flashing.

3.3 FINISHING

A. Finish unprimed fiber cement substrates; coordinate with exterior paint schedule. Follow paint manufacturer's written product recommendation and written application instructions.

3.4 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
SECTION 07 62 00 - SHEET METAL FLASHING, TRIM AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section Includes:
   1. Formed roof-drainage sheet metal fabrications.
   2. Gutters and downspouts
B. Related Requirements:
   1. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
   2. Division 07 section "Standing Seam Metal Roof Panels"
C. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
D. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
B. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.4 QUALITY ASSURANCE
A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40]; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
   1. Surface: Smooth, flat.
   2. Exposed Coil-Coated Finish:
      a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 ROOF GUTTERS AND DOWNSPOUTS

A. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Manufactured Hanger Style:
   2. Fabricate downspouts from the following material:
      a. Prepainted, Metallic-Coated Steel: 0.0217 inch thick.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
      c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nontag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

F. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.

2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
   1. Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws. Do not penetrate wood decking that it to remain exposed.

D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

E. Seal joints as required for watertight construction.
   1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION
SECTION 07 84 00 - FIRESTOPPING

PART 1  GENERAL

1.01  SUMMARY

A. Furnish all labor, materials, equipment and incidentals required and install firestopping and firesafing, including:
   1. Through-penetration firestops and smokestops for fire-rated partition and floor assemblies, both blank (empty) and those accommodating penetrating items, such as, but not necessarily limited to cable trays, electrical signal cables, conduit, pipes, and ducts.
   2. Membrane penetration protection for fire-rated partitions.
   3. Construction Gap Firestoppers:
      a. Construction joint firestops with partitions, floors, or the intersection of floors to exterior walls, or the intersection of top of partitions to ceilings.
      b. Top of partition firestopping in fire-rated partitions.
      c. Top of partition and construction joint smokestopping in smoke partitions.
   4. Intumescent compressible joint filler, designed to prevent the spread of fire through openings between building components.
   5. Accessories as required to provide a complete firestopping system.
   6. Specific conditions requiring firestopping may not be fully detailed on the Drawings. Where a specific firestop system is not indicated on Drawings, the subcontractor shall include proposed system designs in submittals.

B. Design and engineering judgements for nonstandard applications where fire tests and approved systems do not exist.
   1. Firestop design documentation for code official review.

1.02  RELATED REQUIREMENTS

A. Other related work as called for on PLANS or specified elsewhere in this or other TECHNICAL SPECIFICATION Sections.

1.03  NOT USED

1.04  NOT USED

1.05  DESIGN AND PERFORMANCE CRITERIA

A. Provide complete through-penetration firestopping systems which have been tested and approved by UL or FM, or third-party testing agency approved by the Architect, and are listed under their label service.

B. Firestopping Materials and Systems:
   1. Shall be capable of closing or filling through-penetrations created by the following:
      a. The burning or melting of combustible pipes, cable jacketing, or pipe insulation materials.
      b. Deflection of sheet metal electrical and mechanical ductwork due to thermal expansion.
   2. Shall be asbestos free and lead free and shall not incorporate nor require the use of hazardous solvents.
   3. Shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
   4. Shall be moisture resistant and may not dissolve in water after curing.
C. Construction Gap Firestops: Where movement across gap is anticipated, firestopping system shall comply with ASTM E119 or UL 2079.

D. Through-Penetration Firestop Ratings:
   1. Comply with F- and T-ratings as required by local building codes, code official, and as tested in accordance with ASTM E814 or UL 1479 fire tests in a configuration that is representative of project conditions.
   2. The F-rating shall not apply to all through-penetration firestops and shall not be less than the required fire-resistive rating of the assembly penetrated, except as specified.
   3. The T-rating shall apply to through-penetration firestop locations as specified and shall not be less than the required fire-resistance rating of the assembly penetrated.
      a. R-rating shall apply to floor penetration firestops that protect larger than 4-in nominal pipe or 15 square inches in overall cross-sectional areas that are not contained within a wall at the point where they penetrate the floor.
      b. T-rating shall apply to wall penetration firestops that protect larger than 4-in nominal pipe or 15 square inches in overall cross-sectional area, and are below any ceiling. T-rating shall also apply to penetration firestops above corridor ceilings where penetrations are larger than the size indicated herein.
   4. The F-rating and T-rating for penetrations through 4-hour fire-resistance rated walls shall be not less than 3 hours.

E. Surface Burning: Firestop materials shall be classified as Class A tested in accordance with ASTM E84, flame spread maximum 25, and smoke developed maximum 450.

F. Construction Gap Firestops: Gaps that may experience movement shall comply with ASTM E119 or UL 2079.

G. Membrane Penetrations: Comply with applicable Building Code.

1.06 SUBMITTALS

A. Submit a schedule of through-penetrations which indicates the firestop system to be utilized for each different firestopping application.
   1. Approval, prior to submitting the actual schedule.
   2. Schedule shall indicate construction of the wall or floor assembly; size, number, and material of penetrating items; firestop system designation; required F-rating and T-rating; UL-listed system number; remarks where applicable.

B. Submit complete list of all firestop systems to be utilized, corresponding to system designations (FSM-1...) specified herein.
   1. Include all of the individual materials required for each complete system.
   2. Approved Installer: Provide document from manufacturer that recognizes the installer as qualified and approved to install the manufacturer's firestopping materials.
   3. Submit a sample of the firestopping schedule format for the Contractor's and code officials' approval prior to submitting the actual schedule.
      a. Schedule shall indicate construction of the wall or floor assembly; size, number, and material of penetrating items; firestop system designation; required F-rating and T-rating; UL-listed system number; remarks where applicable.
      b. Approved testing agency's standard details of manufacturer's tested firestopping systems in format acceptable to code official.

C. Provide the following within 2 weeks of contract award:
   1. Submit a firestopping schedule which indicates the firestop system to be utilized for each different firestopping application.
2. Submit documentation of UL or FM classification for each material and system to be utilized. Include certification that such listings are current and subject to follow-up service inspection by listing body.

3. Submit copies of manufacturer's product data, material safety data sheets, standard details, and installation instructions for fire-rated firestop assemblies.

D. Submit documentation of UL classification or approved third party testing for each material and system to be utilized. Include certification that such listings are current and subject to follow-up service inspection by listing body.

E. Submit copies of manufacturer's product data, specifications, recommendations, standard details and installation instructions for fire-rated firestop assemblies.

F. Shop Drawings: Submit detail drawings of any fire stopping application for which there is no tested and rated system. Shop drawings shall give all pertinent information of installation method proposed, together with all required dimensions for the proper fitting around other work and materials, together with all special conditions as may be required to complete installation.

1.07 QUALITY ASSURANCE

A. Installer: Company specializing in installing of fire rated and classified fire stopping systems with minimum of 3 years documented experience and approved by material manufacturer.

B. All materials and components shall be the approved products of one manufacturer.

C. Mockup: Provide mockup representative of finished work. Replace unsatisfactory work as directed. Approved mockup will be used as standard for judging acceptability of work on project. Mockup, if approved, may be incorporated as part of final construction.
   1. Provide mockup for each firestop system.
   2. Install sample installation in the present of the materials manufacturer and by Owner's representative, not less than one week in advance of start of work.
   3. Mockup shall be installed in accordance with the specifications and shall be representative of installations to be achieved throughout the project. Mockup not meeting the performance requirements shall be removed and replaced with one that does.
   4. Installations not comparable to the mockup will be subject to rejection and shall be replaced at Subcontractor's expense.

D. Pre-installation Meeting: Prior to start of work that involves cutting penetrations, conduct a meeting with installers of such work to identify fire and smoke barriers and required configurations of penetrations. Discuss the proper procedures and time schedule for cutting, patching, and sealing penetrations in such assemblies, with emphasis on avoiding unnecessary cutting and patching.

1.08 DELIVERY, STORAGE AND HANDLING

A. Conspicuously mark "REJECTED" on materials which have been damaged and remove from site.

B. Store in accordance with manufacturer's recommendations.

C. Install firestop materials before expiration of material shelf life.

1.09 DEFINITIONS

A. "Through-Penetration Firestop" is a material, device, or construction installed to resist, for a prescribed time period, the passage of flame, heat, and hot gases through openings
which penetrate the entire fire-resistive assembly in order to accommodate cables, cable
trays, conduit, tubing, pipes, or similar items.

B.  "F Rating" is the time period that a through-penetration fire block limits the spread of fire,
flame, and hot gases through the fire-block assembly, including penetrating elements,
when tested in accordance with the time-temperature curve defined in ASTM E119, fire
tests of building construction and materials.

C.  "T Rating" is the time period that a through-penetration fire block limits temperature rise
through the fire-block assembly, including penetrating elements, when tested in
accordance with the time-temperature curve defined in ASTM E119, fire tests of building
construction and materials.

D.  Membrane Penetration: Penetrations in a fire-rated partition or floor that breaches only
one side of the barrier.

E.  Construction Gaps: Continuous joint or opening, whether static or dynamic, such as
where the top of a wall meets underside of a floor, wall-to-wall joints, floor-edge-to-floor-
edge joints, floor-edge-to-exterior-wall joints, or other linear breach in a rated barrier.

1.10 WARRANTY

A.  Submit manufacturer's standard written warranty agreeing to repair or replace
components which appear to have failed in general durability or any other form of
apparent deterioration (excluding inherent qualities and limitations clearly specified in the
manufacturer's data which was submitted).

B.  Complete installation shall be warranted jointly and severally, on a single document, by
the materials manufacturer and the Contractor, against defects of materials and
workmanship, as defined on the warranty.

1.11 REGULATORY REQUIREMENTS

A.  Comply with local codes and regulations, where such codes and regulations are more
stringent than requirements indicated on the Drawings and specified in these
specifications.

B.  The firestopping subcontractor shall provide firestopping and smokestopping design
documentation for fire-resistance tested assemblies, as well as for nonstandard
conditions for which no approved tests exist for code official review.

1.12 ENVIRONMENTAL

A.  Apply firestopping materials only when the temperature of surfaces to be filled and
surrounding air temperatures comply with the manufacturer's printed instructions.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A.  3M Corporation, St. Paul, MN, USA.

B.  Grace Construction Products.

C.  Isolatex International.

D.  Owens-Corning.

E.  United States Gypsum.

F.  Hilti.
2.02 MATERIALS

A. Firestop Material Type 1: Mortar type seal.
   1. Water-based mortar capable of expanding a minimum of 3 percent by volume.
      a. Density: 35 to 38 pounds per cubic foot.
      b. Thickness: Minimum of 4-in, or as indicated on the Drawings, or if not indicated, as required for specified fire rating.
   3. Flame spread less than or equal to 25 per ASTM E84.
   4. Fire-Resistance Rating: 2 and 3 hours as required tested in accordance with UL 1479.
   6. Accessory Materials:
      a. Wall Penetration: On-side shuttered using styrofoam panel flush with damming material to be removed after drying.
      b. Floor Penetration – Retainers: Galvanized steel securing clips, holding damming board as recommended by manufacturer.

B. Firestop Material Type 2:
   1. Mineral wool safing insulation.
   2. Regular color unfaced with galvanized steel safing clips.
   3. FS HH-I-521F, Type L.
   4. Manufacturers:
      a. Certainteed.
      b. Manville.
      c. Owens-Corning.
      d. United States Gypsum.

C. Firestop Material Type 3: Firestop compound.
   1. Water-based compound, pourable, trowelable, fusible ceramic fire break materials.
      a. Thickness: 4-in minimum, or if not indicated, as required for specified fire rating.
   3. Flame spread and smoke developed less than or equal to 25 per ASTM E84.
   4. Fire-Resistance Rating: 2 and 3 hours as required tested in accordance with UL 1479.
   5. Products: Flamesafe FS500 and FS600; International Protective Coatings Corporation.
   6. Accessory Materials:
      a. Damming Panel: Use damming board as recommended by manufacturer or Type X gypsum board.
      b. Retainers: Galvanized steel securing clips, holding damming board as recommended by manufacturer.
      c. Bulk Ceramic Fiber: Ceramic fiber to dam smaller openings; resists fire and heat up to 3,000 degrees F.

D. Firestop Material Type 4: Intumescent bands or wrap.
   1. Wrap strip nominal 1/4-in thick intumescent material faced on one side with aluminum foil supplied in 2-1/2-in wide strips.
   3. Flame spread less than or equal to 25 per ASTM E84.
4. Fire-Resistance Rating: 2 to 4 hours, as required, tested in accordance with UL 1479.

E. Firestop Material Type 5: Firestop putty.
1. Moldable putty with one part, intumescent elastomer.
4. Fire-Resistance Rating: 1 to 3 hours as required, tested in accordance with UL 1479.
5. Products:

F. Firestopping Material Type 6: Firestop caulking.
1. Water-based, single-component, endothermic caulk.
3. Flame spread less than or equal to 25 per ASTM E84.
4. Fire-Resistance Rating: 1 to 3 hours as required.

G. Firestop Material Type 7: Heat expanding pillows:
1. Tightly woven dustfree fiberglass cloth bags, filled with a combination of mineral fiber incombustible components, water insoluble expansion agents, and special fire retardant activities.
3. Flame spread less than or equal to 25 per ASTM E84.
4. Fire-Resistance Rating: 1 to 3 hours as required, tested in accordance with UL 1479.
6. Accessory Materials: Wall and floor penetrations use wire mesh bolted to one side of wall or under side of floor.

H. Firestop Material Type 8:
1. Fire-resistant penetration seal.
2. Medium density, fire-resistant foam retaining stability of high temperatures.
3. ASTM E814, Underwriter's Laboratories, Inc., test No. R8196, series as appropriate for wall or floor fire rating indicated.
4. Products:
   b. CP 25WB, Fire Barrier Caulk.
   c. FS 195 wrap strips and putty 303, 3M Corporation.

I. Firestop Material Type 9: Firestop sealant:
1. Silicon-based, single-component sealant.
3. Flame spread 5 per ASTM E84.
4. Fire-resistant rating 1 to 3 hours as required.

J. Firestop Material Type 10: Pipe Choke System:
1. Heavy gauge metal collar, with highly intumescent material.
K. Fire Block for through penetration, multi penetrations, CMU and Concrete.
   1. Ready-to-use, intumescent flexible block based on two-component polyurethane foam. Dimensions (2 in. x 5 in. x 8 in.)
   2. Completely free from dust and fibers, Halogen, asbestos and solvent free.
   3. Expansion Temperature - 149 degrees C
   4. Surface Burning Flame Spread Index - 0 (ASTM E 84-96)
   5. Surface Burning Smoke Development Index - 25 (ASTM E 84-96)
   6. Products: Hilti FS 657 Fire Block

PART 3 EXECUTION

3.01 INSPECTION

A. Examine adjoining construction, and the conditions under which the work is to be installed, and do not proceed with the work until unsatisfactory conditions detrimental to the proper and timely completion of the work have been corrected.

3.02 PREPARATION

A. Verify adjacent materials are clean, dry and ready to receive installation.

B. Verify that openings and items passing through them are ready to receive the Work of this Section.

C. Verify that field dimensions are as shown on the Drawings and as recommended by the manufacturer.

D. Remove incompatible materials which may affect installation.

E. Beginning of installation means acceptance of existing conditions.

F. Protect elements surrounding the work of this Section from damage or disfigurement. Use masking tape where required to prevent contact of firestopping materials with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove smears. Remove tape immediately after installation without disturbing firestopping system.

3.03 INSTALLATION, GENERAL

A. Apply firestopping materials in accordance with manufacturer’s instructions and in conformance with UL listing.

B. Apply firestopping material in sufficient thickness to achieve fire rating required.

3.04 THROUGH-PENETRATING

A. Inspect installation including firestopping materials and any damming or support materials to verify integrity of installation.

B. Where system design permits, remove damming or support materials only after it has been determined that firestopping materials have fully cured or dried.

C. Install any covering materials or finish as per design requirements and manufacturer’s instructions.

D. All firestopping shall be inspected for proper installation, drying, curing, adhesion as appropriate for the materials and systems being used. Where necessary, repairs shall be made and repaired installations shall be reinspected.
3.05 FIRESAFING INSULATION

A. Size insulation strips to be 1/2-in to 3/4-in greater than the measured width of the void or cavity.

B. Impale steel securing clips in insulation approximately midway between top and bottom surface, approximately 8-in in from each end.

C. Push insulation strips into the void or cavity until the securing clips are in contact with the top of floor slab. Top of insulation shall be flush with the floor level.

D. Overlap and butt closely all end joints.

E. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

3.06 REPAIRS AND MODIFICATIONS

A. Identify damaged, improperly installed or reentered seals for repair or modification.

B. Modifications to penetrations shall be accomplished as per the firestop manufacturer's recommendations.

C. Only materials used in the original seal and designated by the manufacturer as suitable for a specific repair shall be used for this purpose.

3.07 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.08 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

B. Protect firestopping material throughout the construction period in a clean and properly protected condition so that each assembly will be without any indication of damage at the time of Substantial Completion.

END OF SECTION
SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
   B. This section applies to the Chaparral Bunkhouses.

1.2 SUMMARY
   A. Section Includes:
      1. Silicone joint sealants.
      2. Urethane joint sealants.
      3. Latex joint sealants.

1.3 SUBMITTALS
   A. Product Data: For each joint-sealant product indicated.

1.4 QUALITY ASSURANCE
   A. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
   B. Product Testing: Test joint sealants using a qualified testing agency.
      1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
      2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

1.5 PROJECT CONDITIONS
   A. Do not proceed with installation of joint sealants under the following conditions:
      1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
      2. When joint substrates are wet.
      3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
      4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL
   A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
   B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
      1. Architectural Sealants: 250 g/L.
      2. Sealant Primers for Nonporous Substrates: 250 g/L.
      3. Sealant Primers for Porous Substrates: 775 g/L.
C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 URETHANE JOINT SEALANTS

A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
      b. Tremco Incorporated; Vulkem 921 or Dymonic FC.

2.3 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Dow Corning Corporation; 790.
      b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
      c. May National Associates, Inc.; Bondaflex Sil 728 NS.
      d. Pecora Corporation; 301 NS.
      e. Sika Corporation, Construction Products Division; SikaSil-C990.
      f. Tremco Incorporated; Spectrem 1.

B. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Pecora Corporation; 898.

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. BASF Building Systems; Sonolac.
      d. Pecora Corporation; AC-20+.
      e. Schnee-Morehead, Inc.; SM 8200.
      f. Tremco Incorporated; Tremflex 834.

2.5 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

B. Butyl-Polyisobutylene Sealant: Manufacturer's standard, solvent-free, butyl-polyisobutylene sealant complying with AAMA 809.2, recommended for concealed joints.

C. Butyl-Polyisobutylene Tape Sealant: Manufacturer's standard, solvent-free, butyl-polyisobutylene tape sealant with a solids content of 100 percent; complying with AAMA 804.1; formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces; packaged on rolls with a release paper on one side; with or without reinforcement thread to prevent stretch.

D. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealants for Concealed Joints:
   a. "BA-98"; Pecora Corp.
   b. "Tremco Acoustical Sealant"; Tremco Inc.

2. Butyl-Polyisobutylene Sealant:
   a. "PTI 606"; Protective Treatments, Inc.

3. Butyl-Polyisobutylene Tape Sealant:
   a. "Extru-Seal Tape"; Pecora Corp.
   b. "Shim-Seal Tape"; Pecora Corp.
   c. "PTI 606"; Protective Treatments, Inc.
   d. "Tremco 440 Tape"; Tremco Inc.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
      a. Concrete.
      b. Stone.
      c. Masonry.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
      a. Metal.
      b. Glass.
      c. Porcelain enamel.
      d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
   4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
   5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
      a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Inspect tested joints and report on the following:
   1. Whether sealants filled joint cavities and are free of voids.
   2. Whether sealant dimensions and configurations comply with specified requirements.
   3. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Sealant Color, general.
   1. Generally use sealant colors matching color of material that joint is located in.
   2. Where wall adjoin other materials or trim, use sealants that match the wall color.
3. Where a joint occurs between two materials of differing colors contact Architect for selection.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non traffic surfaces:
   1. Joint Locations:
      a. Construction joints in stone.
      b. Control and expansion joints in unit masonry.
      c. Joints between different materials listed above.
      d. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
      e. Other joints as indicated.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Construction joints in stone.
      b. Control and expansion joints in unit masonry.
      c. Joints between different materials listed above.
   2. Silicon Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Sealant Location:
      a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      b. Tile control and expansion joints where indicated.
      c. Other joints as indicated.
   2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Perimeter joints between interior wall surfaces and frames of interior doors, casework, windows, trim, and elevator entrances.
      b. Other joints as indicated.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION
SECTION 08 11 00 – HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.
B. Hollow metal frames for wood doors.
C. Thermally insulated hollow metal doors with frames.

1.2 REFERENCE STANDARDS

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvalume) by the Hot-Dip Process; 2015.
F. ITS (DIR) - Directory of Listed Products; current edition.

1.3 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
C. Installation Instructions: Manufacturer’s published instructions, including any special installation instructions relating to this project.
D. Manufacturer’s Certificate: Certification that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years documented experience in commercial
construction.

B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.

C. Single Source: All work of this Section shall be produced by a single manufacturer, unless approved by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   9. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 DESIGN CRITERIA

A. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL DOORS

A. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 – Heavy duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
   2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   5. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
7. Weatherstripping: Refer to Section 08 71 00.

2.4 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. General:
   1. Comply with the requirements of grade specified for corresponding door, except:
      a. ANSI A250.8 - SDI-100, Level 1 Door Frames: 18 gage, 0.053 inch, min thickness.
   2. Finish: Factory primed, for field finishing.
   3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
   4. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

C. Exterior Door Frames: Full profile/continuously welded type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Weatherstripping: Separate, see Section 08 71 00.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.

E. Door Frames, Fire-Rated: Full profile/continuously welded type.
   1. Fire Rating: Same as door, labeled.

F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

2.5 ACCESSORIES

A. Glazing at door vision panels: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
   1. Laminated: With 0.015 inch thick plastic interlayer, comply with ASTM C 1172, ¼" thick.
      a. Refer to drawings for clear or frosted finish.
   2. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.

   3. Glazing Frames: Provide Mullions to each side of glazing to match door finish. Non-removable stops on non-secure side; size and configurations as indicated on the drawings.

A. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.6 FINISHES
A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
C. Factory Finish: Complying with ANSI A 250.3, manufacturer's standard coating of color as selected.
D. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.
C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION
A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.
B. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch.

3.3 INSTALLATION
A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
B. Install fire rated units in accordance with NFPA 80.
C. Coordinate frame anchor placement with wall construction.
D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
E. Install door hardware as specified in Section 08 71 00.
F. Comply with glazing installation requirements of Section 08 80 00.
G. Touch up damaged factory finishes.

3.4 TOLERANCES
A. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.5 ADJUSTING
A. Adjust for smooth and balanced door movement.

3.6 SCHEDULE
A. Refer to Door and Frame Schedule on the drawings.
SECTION 08 14 00 - WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY
A. Related Work: The following items are not included in this Section and are specified under the designated Sections.
   1. Division 06 Section "Rough Carpentry" for rough opening and blocking.
   2. Division 08 Section "Door Hardware" for operating and locking hardware.
   3. Division 09 Section "Staining and Transparent Finishes" for staining of doors and sidelights.

1.3 SUBMITTALS
A. Product Data: Submit manufacturer's product data for each type of stile-and-rail wood door including elevations and details of construction.
B. Shop Drawings: Submit shop drawings of wood doors including door type, door design number, door size, fire rating if applicable, hardware types and locations, hardware blocking requirements and location, panel layout, molding and sticking profile, vision panel, louver cutout or lite opening sizes and locations, and finishing.
C. Verification Samples: Submit two corner samples, minimum 6 inches by 6 inches representing actual products and materials specified indicating visual characteristics and finish. Include range samples if variation of appearance is anticipated.
D. Warranty: Submit manufacturer's standard warranty.

1.4 QUALITY ASSURANCE
A. Manufacturer's Qualifications: Company specializing in manufacturing doors with a minimum of five years documented experience.
B. Single Source Requirements: To the greatest extent practical, wood doors shall be supplied from a single manufacturer.
C. Sustainable Construction: Paneled door construction shall limit use of formaldehyde products during fabrication.
D. Project Conditions: Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions, recommendations and industry standards.
B. Store materials in manufacturer's original labeled packaging until ready for installation and in accordance with manufacturer's instructions. Protect from damage.
1.6 WARRANTY

A. Manufacturer’s Warranty: Provide manufacturer’s standard limited warranty that each panel door bearing the manufacturer’s brand and identification mark complies with Industry Standard WDMA I.S.6A and all revisions in effect as of the date of manufacture, and that each such door, at the time of the shipment, is of good material and workmanship and free from defects that would render such door unserviceable or unfit for the ordinary, recommended use.

2. Warranty Period: Insulated Glass – 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design for interior doors: JELD-WEN, Inc.; 440 South Church Street, Suite 400, Charlotte, NC 28202; Toll Free Tel: 800-535-3936; Tel: 541-850-2606; Fax: 541-851-4333; Email: architectural_inquiries@jeld-wen.com; Web: http://www.jeld-wen.com. Or approved equal.

B. Marshfield Doors.

C. Algoma Hardwoods, Inc.

D. Eggers Industries, Architectural Door Division.

2.2 WOOD DOORS

A. Interior Wood Doors: Prehung Solid Core “Flush” Finish: as manufactured by Jeld-Wen, Inc.

1. Construction: Solid mineral core with all-wood frame.
   a. Stile-and-rail construction
   b. Door Design: shown on drawings or similar.

2. Wood species: Birch veneer plywood.

3. Thickness: 1 3/8"

4. Glazing: Laminated: with 0.015 inch thick plastic interlayer, comply with
   a. ASTM C 1172, ¼” thick

5. Glazing Frames: Provide mullions to each side of glazing to match door finish. Non-removable stops on non-secure side; size and configurations as indicated on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.

2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Door Hardware specification

B. Installation Instructions: Install doors to comply with manufacturer’s written instructions and referenced quality standard, and as indicated.
C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
   1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION
SECTION 08 31 00 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes access doors for installation in the following types of construction:
   1. Gypsum drywall.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data in form of manufacturer’s technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions, and directions for installation of anchorage, devices.
   1. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain access doors for entire project from one source from a single manufacturer.

B. Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Underwriters Laboratories, Inc.’s "Building Materials Directory" for rating shown.
   1. Provide UL label on each fire-rated access door.

C. Size Variations: Obtain Architect’s acceptance of manufacturer’s standard size units, which may vary slightly from sizes indicated.

D. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.5 PROJECT CONDITIONS

A. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering access doors that may be incorporated in the work include, but are not limited to, the following:
   1. Bar-Co., Inc.
   2. Cesco Products
   3. J.L. Industries
   5. Milcor, Inc.
2.2 MATERIALS AND FABRICATION

A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts, and ready for installation.

B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.

C. Frames: Fabricate from 16-gage steel.
   1. Fabricate frame with exposed flange nominal 1-inch wide around perimeter of frame for units installed in the following construction:
      a. Exposed masonry.
      b. Drywall finish.
   2. For gypsum drywall, furnish perforated frames with drywall bead.
   3. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.
   4. For full-bed plaster applications, furnish frames with galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

D. Flush Panel Doors: Fabricate from not less than 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.
   1. For fire-rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.

E. Locking Devices: Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.
   1. Provide one cylinder lock per access door. Furnish 2 keys per lock. Key all locks alike, unless otherwise scheduled.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's instructions for installation of access doors.

B. Coordinate installation with work of other trades.

C. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

D. Painting- Refer to Painting for finishing access panels.

3.2 ADJUST AND CLEAN

A. Adjust hardware and panels after installation for proper operation.

B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION
SECTION 08 54 00 - COMPOSITE WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Composite-framed windows of the following types: single-hung, casement, awning, and fixed.

1.3 REFERENCES

A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.

B. American Architectural Manufacturers Association (AAMA):
   1. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.

C. Andersen Unit Installation Guide.

D. ASTM International (ASTM):

E. Insulating Glass Certification Council (IGCC):
   1. Insulating Glass Unit Certification.

F. International Standards Organization (ISO):
   1. ISO 14021 - Environmental Labels and Declarations -- Self-Declared Environmental Claims (Type II Environmental Labeling).

G. National Fenestration Rating Council (NFRC):
   1. NFRC 100 - Procedure for Determining Fenestration Product U-factors.
H. U.S. Environmental Protection Agency (EPA):
   1. ENERGY STAR.

I. Window and Door Manufacturers Association (WDMA):
   1. WDMA Hallmark Certification Program for Manufacturers.

1.4 SUBMITTALS
A. Product Data: For each type of product required.

B. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of walls, specified loads, flashings, vents, sealants, and interfaces with all materials not supplied by the window manufacturer, and identification of proposed component parts and finishes.

C. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of material required.

D. Certificates: Signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

E. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.

F. Manufacturer's Instructions: Manufacturer installation, storage, and other instructions.

G. Qualification Statements: For manufacturer and installer.

1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications:
   1. Member in good standing of The Insulating Glass Certification Council (IGCC).
   2. Hallmark Certified Manufacturer and member in good standing of the Window and Door Manufacturers Association (WDMA).

B. Installer Qualifications:
   1. Minimum five years' experience in the commercial installation of products required for the Project.
   2. Experience on at least five projects of similar size, type and complexity as the Project.
   3. An entity utilizing workers competent in techniques required by manufacturer for product types and applications indicated.

1.6 DELIVERY, STORAGE AND HANDLING
A. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Deliver materials to Project in manufacturer's original unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials and accessories protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer off ground, under cover and not exposed to weather and construction activities.

1.7 WARRANTY
A. Special Warranty: Manufacturer's transferrable, non-prorated limited warranty.
   1. Warranty Period, Glass: 20 years.
   2. Warranty Period, Non-Glass Parts: 10 years.
3. Warranty Period, Color Fade: 5 years.

B. Special Warranty: Installer's standard form in which installer agrees to repair or replace composite windows that fail due to poor workmanship or faulty installation within the specified warranty period.
   1. Warranty Period: two years from date of Substantial Completion.

PART 2 - PRODUCT

2.1 COMPOSITE WINDOWS

A. General: Provide composite windows complying with the performance requirements indicated and tested according to NAFFS.

B. Basis-of-Design Product: Subject to compliance with requirements provide Andersen Corporation: Andersen 100 Series windows.

C. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Substitution Procedures.

2.2 MATERIALS

A. Material Composition: Extruded composite profile consisting of 40 percent reclaimed pre-consumer wood fiber and 60 percent thermoplastic polymer, by weight.

B. Manufacturer Designation: Fibrex material.

C. Interior Color: To be selected by Architect from manufacturer's full range of color options.

D. Exterior Color: To be selected by Architect from manufacturer's full range of color options.

E. Exterior Color Retention: Resist fading with a change of no more than 5 Delta E units over 10 years in compliance with color retention provisions of AAMA 615 and ASTM D2244.

2.3 WINDOW

A. Window Type: As indicated on drawings.

B. Performance Requirements: Comply with NAFFS.
   2. Casement, Performance Class and Grade: LC-PG40 (71-1/2 inches by 71-1/2 inches).
   3. Awning, Performance Class and Grade: LC-PG40 (47-1/2 inches by 95.5 inches).
   4. Fixed, Performance Class and Grade: LC-PG40 (95-1/2 inches by 71-1/2 inches).

C. Environmental Qualifications:
   1. ENERGY STAR performance.
   2. Indoor air quality performance.

D. Weatherstrip Type and Material: Three fins and pile, polypropylene or Flexible tubular and leaf, vinyl.

E. Attachment Flange: 1-3/8 inches flange setback or 1 inch flange setback with stucco key as required for specific substrate application.

F. Hardware:
   1. Operator Gear Type and Material: Rotary, die cast zinc.
   2. Hinge Type and Material: Hinged, 300 series stainless steel with heavy gauge arms.
   3. Operator Handle Type and Material: Folding, polycarbonate with integral color.
5. Hardware Type and Material: Self-latching, polycarbonate with integral color.

G. Insect Screens:
1. Frame Material: Aluminum.
2. Frame Color: Match window frame.
3. Insect Screen Material: Metal.

2.4 GLAZING

A. Glass Units: Provide insulating glass units certified through Insulating Glass Certification Council as conforming to the requirements of IGCC and ASTM E2190.
   1. Manufacturer Designation: Andersen High-Performance Low-E Glass.
   2. Seal and Spacer Type: Dual sealed insulating glass units with polysobutylene primary seal, silicone secondary seal and metal spacers with bent or soldered corners.
   3. Glass Type: Flat, Low-E4 glass, ASTM C1036 or heat strengthened tempered glass, ASTM C1048, with argon gas fill as designated on drawings or as required by Code.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
D. Always retain paragraph below.
E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer’s product recommendations, including but not limited to the Andersen Unit Installation Guide, and installation information in product literature and on product packaging. Comply with Drawings and Shop Drawings for installing windows, hardware, accessories, and other components.
B. Install windows plumb, level and square. Anchor windows securely to structure in correct orientation to flashing and adjacent construction as indicated. Comply with installation instructions for proper flashing integration of window into wall system. Install windows so as to drain water penetration to the exterior.
C. Adjust sashes, insect screens, ventilators, hardware and accessories as applicable for correct fit. Adjust weatherstrip for smooth operation and weather-tight closure.

3.3 FIELD QUALITY CONTROL

A. Manufacturer’s Field Services: If requested by Owner, provide manufacturer’s field service consisting of product use recommendations and periodic site visits for observation of product installation in accordance with manufacturer’s recommendations.
   1. Site Visits: One per building.
B. Field Testing: Provide field testing of installed units.
1. Test units in compliance with AAMA 502.
2. Use test equipment calibrated according to ASTM E1105.

3.4 CLEANING

A. Remove protective films and non-permanent labels prior to 90 days after installation.
B. Remove excess sealant, soiling, dirt and other substances. Clean window frame and glass surfaces. Avoid damaging coatings and finishes.
C. Touch-up, repair or replace glass or other window components broken, scratched or damaged during construction prior to Substantial Completion.
D. Remove and lawfully dispose of construction debris from Project site.

3.5 PROTECTION

A. Protect installed windows and finish surfaces from damage during construction until completion of Project and acceptance by Owner.

END OF SECTION
SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02 WORK INCLUDED
   A. Door Hardware

1.03 RELATED SECTIONS
   A. Section 08 "Hollow Metal Doors and Frames", exterior metal doors and frames.
   B. Section 08 "Flush Wood Doors", interior wood doors.

1.04 REFERENCES
   A. National Fire Protection Association, Inc. (NFPA), Battery March Park, Quincy, MA 02269.
      0. NFPA 80 - Standard for fire doors and windows.
      1. NFPA 101 - Code for safety to life from fire in buildings and structures.
   B. Underwriter's Laboratories, Inc. (UL), 333 Pfingsten Road, Northbrook, IL 60062.

1.05 SUBMITTALS
   A. Submit in accordance with the General Conditions of the Contract.
      1. Detailed, vertical type hardware schedule for approval.
         a. List and describe each opening separately. Include doors with identical hardware, except hand, in a single heading. Include door number, room designations, degree of swing, and hand.
         b. List related details. Include dimensions, door and frame material, and other conditions affecting hardware.
         c. List all hardware items. Include manufacturer's name, quantity, product name, catalog number, size, finish, attachments, and related details.
         d. Determine keying requirements, as directed by the Owner's Representative.
      2. Samples of hardware items as may be required. Identify each sample and indicate the location of subsequent installation in the project.
      3. A copy of the approved hardware schedule and all pertinent templates or template information to each fabricator of material factory-prepared for the installation of hardware.

1.06 QUALITY ASSURANCE
   A. Manufacturers and product numbers listed herein establish a standard of quality. Similar items by other manufacturers may be accepted by prior approval in accord with the General Conditions of the Contract. Except where specified in the hardware schedule, furnish products of only one manufacturer for each type of hardware.
   B. Supplier: Hardware Supplier: The hardware supplier shall be a corporate member in good standing of The Door and Hardware Institute (DHI), employing at least one Architectural Hardware Consultant (AHC) who is currently participating in DHI’s continuing education program (CEP).
C. Items of hardware not definitely specified herein but necessary for completion of the Work shall be provided. Such items shall be of type and quality suitable to the service required and comparable to the adjacent hardware. Where size and shape of members is such as to prevent the use of types specified, hardware shall be furnished of suitable types having as nearly as practicable the same operation and quality as the type specified. Sizes shall be adequate for the service required. Include such nuances as strike type, strike lip, raised barrel hinges, mounting brackets, fasteners, shims, and coordination between conflicting products. All doors shall be provided with a stop.

1.07 REGULATORY REQUIREMENTS
   A. Furnish UL listed hardware for all UL labeled openings in conformance with requirements for the class of opening scheduled.

1.08 DELIVERY, STORAGE AND HANDLING
   A. Deliver hardware to the job site in the manufacturer's original containers marked to correspond with the approved hardware schedule for installation location.
   B. Store hardware in dry surroundings and protect against loss and damage.

PART 2 - PRODUCTS
2.01 MANUFACTURERS
   A. Refer to the Hardware Schedule at the end of this Section.

2.02 ACCESSORIES
   A. Furnish all necessary hardware accessories such as wood or machine screws, bolts, nuts, anchors, toggle bolts, and other fasteners, each of the type, size, material and finish for its intended purpose and each according to the material to which the hardware is being applied.
   B. Keying system will be determined by the Owner's Representative.

PART 3 - EXECUTION
3.01 INSTALLATION
   A. Install hardware in accordance with manufacturer's recommendations and instructions.
   B. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the fire rating.
   C. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.
   D. Remove, cover or protect hardware after fitting until paint or other finish is applied. Permanently install hardware after finishing operations are complete.
   E. Install closers on the room side of corridor doors, stair side of stairways, and interior side of exterior doors.
   F. Deliver one complete set of installation and adjustment instructions, and tools with the hardware.
   G. Coordinate security system electrical requirements at doors indicated to have such system.
   H. Coordinate all Owner Furnished Contractor Installed hardware.

3.02 ADJUSTING
A. At final completion, adjust and test all hardware for function and performance and leave in good operating condition.

3.03 CLEANING
A. Clean all hardware to restore the original finish.

3.04 PROTECTION
A. Protect the finished installation until acceptance of the project.

3.05 HARDWARE SCHEDULE

A. Manufacturers
1. Hinges Hager Co.
   a. Approved Equals: McKinney
      Bommer
2. Lockset Hager Co.
   a. Approved Equals: Sargent
      Corbin Russwin
3. Door Closers Hager Co.
   a. Approved Equals: Sargent 351 Series
      Corbin Russwin DC8000 Series
   a. Approved Equals: Rockwood Mfg. Co
      Trimco
5. Weather seals and threshold: Hager Co.
   a. Approved Equals: Pemko
      Reese
   a. Approved Equals: Rockwood Mfg. Co
      Trimco
7. Overhead stops: ABH Manufacturing Company
   a. Approved Equals: Rockwood Mfg. Co
      Sargent

B. Hardware Sets:

SET 1A
EA HINGES AS REQUIRED 630 HAGER
1 EA ENTRY LOCK 3453 ARC 626 HAGER
1 EA CLOSER 5200 MLT FC 689 HAGER
1 EA WALL STOP 236W 630 HAGER
1 EA THRESHOLD 410S MIL HAGER
1 EA SWEEP 750SN CLR HAGER
1 SET SEALS 891SV MIL HAGER

SET 1B
EA HINGES AS REQUIRED 630 HAGER
1 EA STOREROOM LOCK 3480 ARC 626 HAGER
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<thead>
<tr>
<th>Item Description</th>
<th>Model</th>
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<tr>
<td>EA HINGES</td>
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<td>630 HAGER</td>
</tr>
<tr>
<td>1 EA PRIVACY LATCH</td>
<td>3440 ARC</td>
<td>626 HAGER</td>
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<tr>
<td>1 EA OVERHEAD STOP</td>
<td>1020</td>
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<td>1 SET SEALS</td>
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<td><strong>SET 2B</strong></td>
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<td><strong>SET 2C</strong></td>
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<td>1 PR AUTOMATIC FLUSH BOLTS</td>
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<td>1 EA DUST PROOF STRIKE</td>
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<td>2 EA Closer</td>
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<tr>
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<td>1 EA THRESHOLD</td>
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<td>1 EA PASSAGE LATCH</td>
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<td>1 EA CLOSER</td>
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<td>689 HAGER</td>
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<td>1 EA KICKPLATE</td>
<td>10&quot; x 2&quot; LDW</td>
<td>630 HAGER</td>
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<td>PUSH PLATE</td>
<td>30S-3.5x15</td>
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<td>2</td>
<td>KICKPLATE</td>
<td>10&quot; x 2&quot; LDW</td>
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<td>WALL STOP</td>
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SECTION 08 83 00 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. Section includes the following types of silvered flat glass mirrors:
   1. Annealed monolithic glass mirrors.
   2. Tempered glass mirrors qualifying as safety glazing.
   3. Size as indicated on drawings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For mirrors to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer’s written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer’s written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer’s written instructions. Defects include discoloration, black spots, and clouding of the silver film.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.

B. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.
2.2 SILVERED FLAT GLASS MIRRORS

A. Tempered Glass Mirrors: Mirror Glazing Quality for blemish requirements and complying with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied; clear.
   1. Nominal Thickness: 3.0 mm.

B. Safety Glazing Products: For tempered mirrors, provide products that comply with 16 CFR 1201, Category II.

2.3 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.4 MIRROR HARDWARE

A. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.
   1. Bottom and Side Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.
   2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION

A. Fabricate mirrors in the shop to greatest extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.
3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Provide a minimum airspace of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
   1. Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
   2. Install mastic as follows:
      a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
      b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
      c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of 1/8 inch between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION
SECTION 09 24 00 – PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Exterior Portland cement plasterwork with integral color (stucco) on metal lath over unit masonry or sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
B. Samples for Initial Selection: For each type of field applied finish coat indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Before plastering, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Install mockups for each type of finish indicated.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
   3. Mock-up to be located on backside of building.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.
B. Exterior Plasterwork:
   1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
   2. Apply plaster when ambient temperature is greater than 40 deg F.
   3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

PART 2 - PRODUCTS

2.1 METAL LATH


2.2 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
B. Metal Accessories:
   1. Foundation Weep Screed: Fabricated from zinc.
   2. Cornerbeads: Fabricated from zinc.
      a. Bull nose cornerbead, radius 3/4 inch minimum, with expanded flanges; use at
         locations indicated on Drawings.
   3. Casing Beads: Fabricated from zinc; square-edged style; with expanded flanges.
   4. Control Joints: Fabricated from zinc; one-piece-type, folded pair of unperforated
      screeds in M-shaped configuration; with perforated flanges and removable
      protective tape on plaster face of control joint.
   5. Expansion Joints: Fabricated from zinc; folded pair of unperforated screeds in M-
      shaped configuration; with expanded flanges.

C. Plastic Accessories: Not permitted.

2.3 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of
   damaging plaster, lath, or accessories.

B. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

2.4 PLASTER MATERIALS

A. Portland Cement: ASTM C 150, Type II.
   1. Color for Finish Coats: To be selected by Architect from full range of available
      colors.

B. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish
   plaster color to match Architect's sample.

C. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

D. Sand Aggregate: ASTM C 897.
   1. Color for Job-Mixed Finish Coats: To be selected by Architect from full range of
      available colors.

2.5 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat
   plasterwork as follows:
   1. Portland Cement Mixes:
      a. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to
         1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious
         material.
      b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to
         1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material,
         but not less than volume of aggregate used in scratch coat.
   2. Portland and Masonry Cement Mixes:
      a. Scratch Coat: For cementitious material, mix 1 part portland cement and 1 part
         masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious
         material.
      b. Brown Coat: For cementitious material, mix 1 part portland cement and 1 part
         masonry cement. Use 3 to 5 parts aggregate per part of cementitious material,
         but not less than volume of aggregate used in scratch coat.

C. Job-Mixed Finish-Coat Mixes:
1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 1-1/2 to 2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
2. Masonry Cement Mix: 1 part masonry cement and 1-1/2 to 3 parts aggregate.
3. Portland and Masonry Cement Mix: For cementitious materials, mix 1 part portland cement and 1 part masonry cement. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Proceed only after installation of water repellant per Division 08.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLING METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C 1063.

3.4 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External Corners:
   1. Install lath-type, external-corner reinforcement at exterior locations.

C. Install control joints as indicated on drawings and per the following guidelines: Obtain approval of Architect joint pattern prior to installing plaster.
   1. Delineate plasterwork into areas (panels) of the following maximum sizes:
      a. Vertical Surfaces: 144 sq. ft.
      b. Horizontal and other Nonvertical Surfaces: 100 sq. ft.
      c. At distances between control joints of not greater than 18 feet o.c.
      d. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
      e. Where control joints occur in surface of construction directly behind plaster.
      f. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.5 PLASTER APPLICATION

A. General: Comply with ASTM C 926.
   1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
   2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does
not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on masonry; 3/4-inch thickness.
1. Portland cement mixes.

C. Plaster Finish Coats: Apply to provide finish to match Architect's sample.

3.6 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.7 PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION
SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Interior gypsum board.
   2. Tile backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

PART 2 - PRODUCTS

2.1 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Gypsum Co.
      c. Temple.
      d. USG Corporation.

B. Regular Type:

C. Thickness: 5/8-inch.
   1. Long Edges: Tapered.
   2. Provide one of the following products where Type X gypsum wallboard is indicated:
      a. Gold Bond Brand Fire-Shield Wallboard as manufactured by National Gypsum Co.
      b. Toughrock Fireguard Gypsum Wallboard as manufactured by Georgia-Pacific.
      c. Firecode Core Gypsum Wallboard as manufactured by USG.


E. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
   1. Thickness: 1/2-inch.
   2. Long Edges: Tapered.

F. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178, at all Restroom walls and Janitor walls adjacent to mop sink for a minimum of 4’ from edge of mop sink, and as follows:
1. **Product:** Subject to compliance with requirements, provide "Dens-Shield Tile Backer" manufactured by G-P Gypsum Corp.

2. **Core:** 5/8 inch, Type X.

### 2.2 TRIM ACCESSORIES

A. **Interior Trim:** ASTM C 1047.
   1. **Material:** Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
   2. **Shapes:**
      a. Corner bead, straight and curved.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.
      c. L-Bead: L-shaped; exposed long flange receives joint compound.
      d. Expansion (control) joint.
      e. Fry Reglet type “Z” trim.

B. **Floor Trim:** Provide 1/2" Extruded PVC GDW Waterguard: installed continuously at floor level of all gypsum dry wall throughout building.

### 2.3 JOINT TREATMENT MATERIALS

A. **General:** Comply with ASTM C 475/C 475M.

B. **Joint Tape:**
   1. **Interior Gypsum Wallboard:** Paper.

C. **Joint Compound for Interior Gypsum Wallboard:** For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. **Pre-filling:** At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. **Embedding and First Coat:** For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
      a. **Use setting-type compound for installing paper-faced metal trim accessories.**
   3. **Fill Coat:** For second coat, use setting-type, sandable topping compound.
   4. **Finish Coat:** For third coat, use setting-type, sandable topping compound.
   5. **Skim Coat:** For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. **Joint Compound for Tile Backing Panels:**
   1. **Cementitious Backer Units:** As recommended by backer unit manufacturer.

### 2.4 AUXILIARY MATERIALS

A. **General:** Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. **Laminating Adhesive:** Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
   1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. **Steel Drill Screws:** ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. **Sound Attenuation Blankets:** ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
E. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."

F.Textures Finish materials: Latex-based compound.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

D. Locate edge and end joints over supports. Do not place tapered edges against cut edges or ends.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces.
   1. Fit gypsum panels around ducts, pipes, and conduits.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Regular Type: Vertical surfaces, unless otherwise indicated.
   2. Ceiling Type: Ceiling surfaces.

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application.
   2. On partitions/walls, apply gypsum panels vertically (parallel to framing).
   3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence.
   2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints.
   3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
3.4 INSTALLING TRIM ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Interior Trim: Install in the following locations:
   1. Corner bead: Use at outside corners.
   2. LC-Bead: Use at exposed panel edges.
   3. L-Bead: Use where indicated.

3.5 FINISHING GYPSUM BOARD

A. Pre-fill open joints, rounded or beveled edges, and damaged surface areas.

B. Apply joint tape over joints, except those with trim having flanges not intended for tape.

C. Gypsum Board Finish Levels: Finish panels to levels indicated below:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 2: Panels that are substrate for tile.
   3. Level 3: Where indicated on Drawings.
   4. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
   5. Level 5: Where indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. Apply finish texture coating in accordance with manufacturer’s instructions and to match approved sample.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION
SECTION 09 31 00 - TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 WORK INCLUDED

A. Shall include interior tile work and tile or metal cove base.

1.3 RELATED SECTIONS

A. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.4 STANDARDS

A. Unless modified or exceeded by this Specification, conform to the following:
   1. For mortar composition and mixing, tile setting techniques, etc.
   2. ANSI A108.1 Ceramic Tile Installed with Portland Cement Mortar.
   3. A108.4 Ceramic Tile Installed with Water-Resistant Organic Adhesives.
   4. A108.5 Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.6 SUBMITTALS

A. Conform to procedures specified in Division 01 and the requirements below.
   1. Product data - Required for tile, grout, accessories, waterproofing systems, pavers, including color and pattern plates for tile, and color plates for grout and accessories.
   2. Samples -
      a. Selection sets of color / pattern tile chips selected from color pattern plates above.
      b. Each type of ceramic accessory.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store liquid materials in unopened containers and protected from freezing.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.
PART 2 - PRODUCTS

2.1 TILE

A. Acceptable Manufacturers/Products listed below.
   1. Bunkhouse Casa Este & Casa Grande
      a. Field Tile: similar or equal product
         1) Manufacturer: Crossville
         2) Size: 12” x 24”, pattern shown on drawings
         3) Color: Roasted Marshmallow. GC to provide sample to Owner & Architect for final approval.

B. Unless otherwise shown, provide bullnose trim and bases, with premolded outside corner pieces for trim and bases sized to line with field joint pattern at outside wall corners.

2.2 CEMENT MORTAR AND GROUT MATERIALS

A. Cement - ASTM C150 Type I portland cement, standard gray unless white is shown.

B. Lime - ASTM C206 or C207, Type S. Hydrated.

C. Sand - ASTM C144. Clean and graded. For latex mortar use No. 4 silica sand.

D. Mortar color - Mineral oxide color in dry powder form as selected from a full range of at least 40 standard colors.

2.3 PREPARED MORTARS

A. Dry-set mortar - ANSI A118.1. Water retentive sanded portland cement mortar designed to eliminate the soaking of either tile or backing surfaces before installation.

B. Latex Portland Cement mortar - Above dry set mortar mixed with manufacturers latex emulsion instead of water.


D. Tile setting epoxy - A 2-part system manufactured under license of the Tile Council of America formula AAR-11.

2.4 PREPARED GROUTS

A. Colored grout - As follows in colors selected from the manufacturer’s full range of at least 40 colors: Provide neat grouts for self spacing and string joints less than 1/8" wide, sanded grouts for 1/8 in. and wider joints. GC to provide sample to Architect for final approval.
   1. Mastic - Manufactured under license of the Tile Council of America

B. Acid resistant grout - Cement base acid and alkali resistant compound.


2.5 SEALING

A. Materials:
   1. Tile sealer - A 2 component colorless non-yellowing liquid. Designed to provide a soil and graffiti resistant surface on unglazed tile without affecting its color except for imparting a slight sheen.
2.6 STRESS RELIEF  

PART 3 - EXECUTION  
3.1 EXAMINATION  
A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.  
1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.  
2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.  
3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.  
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION  
A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.  
B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 GENERAL  
A. Layout and patterns: Where possible, lay out so that fields or patterns center in the areas and/or on architectural features, and so that wherever possible no cut course is less than 1/2 full tile width. Where floor and base, or floor, base and wall tile are the same units, lay floor, base and/or wall patterns to match. Unless otherwise shown, lay patterns square with the floors and walls, and uniform rectangular individual tiles in straight joint pattern, paver brick in common bond. Adjust individual tile or sheet tile to uniform joint width and pattern alignment as laid.  
B. Cutting and fitting: Grind cut edges of tile and carefully joint against trim, finish, etc. Fit tile close around pipes, fixtures and fittings so that plates, collars or other coverings will overlap the cuts. Split tile is prohibited unless no alternative is possible. Build tile around penetrating objects in a neat and workmanlike manner.
3.4 CEMENT MORTARS
A. Mixing: Proportion by volume for each type installation as specified. Mix ingredients thoroughly before adding water. Add water as required for floor, wall or ceiling application.

3.5 PREPARED MORTARS
A. Mixing: Mix and use prepared mortars in accordance with manufacturer’s directions.

3.6 WALL TILE INSTALLATION METHODS
A. Refer to tile manufacturer’s instructions for installation methods, as well as Follow Tile Council of North America guidelines EJ 171

3.7 GROUTING
A. Mixing: Cement grout:
   1. For quarries and/or pavers bed-set or thin-set over concrete where not otherwise specified, mix 1 part standard cement, 2 parts sand and not more than 1/5 part lime with water.
   2. Add masonry colors in accordance with approved samples.
B. Prepared grouts - For floor or wall tile thin-set in Dry Set mortar, use Dri-set grout, except for exterior work use latex portland cement grout. For quarries bed-set, use acid resistant grout. Mix prepared grouts according to manufacturer’s directions.
C. Installation: Coat unglazed tile with grout release. Spread grout uniformly over surface and work solidly into joints. Wipe excess from surface and wipe out joints flush with square edge tile, and to expose cushion of cushion edge tile. Sprinkle floor joints with dry grout mix while green and rub in to a uniform fine dense surface.

3.8 STRESS RELIEF
A. Control joints: Required over construction joints in concrete slabs, at inside wall, and ceiling corners. Cut through beds while fresh, leave open joints and grout with Sealant - mildew resistant finished as required for Grout joints. Such joints shall be the same width as regular joints unless shown otherwise.

3.9 CLEANING
A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile floors.
C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.10 SEALING

A. Application: After completion of grouting, mix and apply one even coat on required surfaces according to its manufacturer's directions by spraying.

END OF SECTION
SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This section applies to the Chaparral Bunkhouses.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
   1. Wood.
   2. Fiber Cement Siding and Trim
   3. Steel.

B. Related Requirements:
   1. Division 05 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
   2. Division 09 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:
   1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 1 gallon of each material and color applied.

1.5 QUALITY ASSURANCE

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.
1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Benjamin Moore & Co.
   3. Dunn-Edwards Corporation.
   4. ICI Paints.
   6. PPG Architectural Finishes, Inc.
   7. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Architect from manufacturer’s full range.

2.3 PRIMERS/SEALERS

A. Primer, Bonding, Solvent Based: MPI #69.

2.4 METAL PRIMERS

A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.

B. Primer, Galvanized, Water Based: MPI #134.

2.5 WOOD PRIMERS

A. Primer, Oil for Exterior Wood: MPI #7.

2.6 SOLVENT-BASED PAINTS

A. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): MPI #94.

B. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. New Wood Substrates:
   1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

H. Fiber Cement Board Substrates: Clean substrate per fiber cement board manufacturer's written instructions. If primed, touch up shop-primed surfaces where damaged with fiber cement board manufacturer’s primer.

3.3 APPLICATION

A. Apply paints according to manufacturer’s written instructions and recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Steel Substrates:
1. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
3. Topcoats: Alkyd, quick dry, satin.

B. Galvanized-Metal Substrates:
1. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
3. Topcoats: Alkyd, exterior, satin.

C. New Wood Substrates: Including exterior wood trim, fascias, exposed beams.
1. Prime Coat: Primer, oil for exterior wood, MPI #7.
3. Topcoat: Alkyd, exterior, satin.

D. Unprimed Fiber Cement Substrates: Including exterior trim, fascias, and paneling.
1. Prime Coat: Primer, oil for exterior wood, MPI #7.
3. Topcoat: Alkyd, exterior, satin.
E. Primed Fiber Cement Substrates: Including exterior trim, fascias, and paneling.
   1. First Coat: Exterior alkyd enamel matching topcoat.
   2. Topcoat: Alkyd, exterior, satin.

END OF SECTION
SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Steel.
   2. Wood with opaque finish.
   3. Galva
   4. nized metal.
   5. Gypsum board.

B. Related Requirements:
   1. Division 05 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
   2. Division 09 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
   3. Division 09 "Staining and Transparent Finishes" for surface preparation and the application of finish on wood substrates.

C. Scope: Finish all interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Exposed surfaces of steel lintels and ledge angles.
   2. Mechanical and Electrical:
   3. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
   4. In finished areas, paint shop-primed items.
   5. All exposed to view Fire Sprinkler Piping and fittings to be painted to match adjacent surfaces. Submit sample colors for architect approval.

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Floors, unless specifically so indicated.
   7. Concealed pipes, ducts, and conduits.

1.3 DEFINITIONS

A. MPI: Master Painters Institute.
1.4 ACTION SUBMITTALS
   A. Product Data: For each type of product. Include preparation requirements and
      application instructions.
   B. Samples for Initial Selection: For each type of topcoat product.
   C. Samples for Verification: For each type of paint system and in each color and gloss of
      topcoat.
      1. Submit Samples on rigid backing, 8 inches square.
      2. Label each Sample for location and application area.

1.5 MAINTENANCE MATERIAL SUBMITTALS
   A. Furnish extra materials, from the same product run, that match products installed and
      that are packaged with protective covering for storage and identified with labels
      describing contents.
      1. Paint: 1 gallon of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Store materials not in use in tightly covered containers in well-ventilated areas with
      ambient temperatures continuously maintained at not less than 45 deg F.
      1. Maintain containers in clean condition, free of foreign materials and residue.
      2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS
   A. Apply paints only when temperature of surfaces to be painted and ambient air
      temperatures are between 50 and 95 deg F.
   B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less
      than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
   A. Manufacturers: Subject to compliance with requirements, available manufacturers
      offering products that may be incorporated into the Work include, but are not limited to,
      the following:
      1. Benjamin Moore & Co.
      2. Dunn-Edwards Corporation.
      3. ICI Paints.
      5. PPG Architectural Finishes, Inc.

2.2 PAINT, GENERAL
   A. MPI Standards: Provide products that comply with MPI standards indicated and that are
      listed in its "MPI Approved Products List."
   B. Material Compatibility:
      1. Provide materials for use within each paint system that are compatible with one
         another and substrates indicated, under conditions of service and application as
         demonstrated by manufacturer, based on testing and field experience.
      2. For each coat in a paint system, provide products recommended in writing by
         manufacturers of topcoat for use in paint system and on substrate indicated.
C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Colors: As selected by Architect from manufacturer's full range.
1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.3 PRIMERS/SEALERS
A. Primer Sealer, Latex, Interior: MPI #50.
B. Primer, Alkali Resistant, Water Based: MPI #3.

2.4 METAL PRIMERS
A. Primer, alkyd, anti-corrosive, for metal, MPI #79.
B. Primer, Galvanized, Water Based: MPI #134.

2.5 WATER-BASED PAINTS
A. Latex, Interior, Flat, (Gloss Level 1): MPI #53.
B. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.
3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed:
a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Roof deck and structural items.
d. Pipe hangers and supports.
e. Metal conduit.
f. Security bars and frames.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer’s written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer’s written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. All interior primers and paints used in occupied areas of the building shall be low order, low VOC.

B. Steel Substrates:
   1. Latex over Alkyd Primer System:
   2. Manuf. Glidden
      a. Primer DEVEFLEX 4020PF DTM
         1) Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79.
      b. Semi-gloss finish: Ultra Hide 150 Interior paint
         1) Intermediate Coat: Latex, interior, matching topcoat.
         2) Topcoat: Latex, interior, satin.

C. Galvanized-Metal Substrates:
   1. Latex over Waterborne Primer System:
      a. Prime Coat: Primer, galvanized, water based, MPI #134.
      c. Topcoat: Latex, interior, satin.

D. Gypsum Board Substrates:
   1. Latex System:
      a. Manufacturer: Sherwin Williams, Acrylic-Enamel Finish
1) Harmony Low Odor Semi-gloss, A98-100 Series (2 coats after Primer)
2) Primer: PrepRite 200 latex Wall Primer B28W200 (thickness not less than 1.2 mils recommended by manufacturer)
3) Or Approved equal  
b. Prime Coat: Latex, interior, matching topcoat.  
c. Topcoat: Latex, interior, egg-shell.

E. Painted Wood Substrates:
   1. Latex System:  
      b. Topcoat: Latex, interior, satin.

END OF SECTION
SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and application of wood finishes on the following substrates:
   1. Interior Substrates:
      a. Exposed glued-laminated beams and columns.
      b. Dressed lumber (finish carpentry).
      c. Exposed wood panel products.
   
B. Related Requirements:
   1. Division 09 "Exterior Painting" for standard paint systems on exterior substrates.
   2. Division 09 "Interior Painting" for stains and transparent finishes on concrete floors.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

D. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.

D. Product List: For each product indicated, include the following:

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials [from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Stains and Transparent Finishes: 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.
1.7 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sealer–Sherwin Williams

B. Or equal.

2.2 MATERIALS, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:
   1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior stains and finishes applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   1. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
   2. Shellacs, Clear: VOC not more than 730 g/L.
   3. Stains: VOC not more than 250 g/L.
   4. Primers, Sealers, and Undercoaters: 200 g/L.

D. Low-Emitting Materials: Interior stains and finishes shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Stain Colors: As selected by Architect from manufacturer's full range.

2.3 WOOD FILLERS

A. Alkyd, Sanding Sealer, Clear: MPI #102.

2.4 STAINS

A. Stain, Semi-Transparent, for Interior Wood: MPI #90.

2.5 POLYURETHANE VARNISHES

A. Varnish, Interior, Polyurethane, Oil-Modified, Satin (Gloss Level 4): MPI #57.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with finish application only after unsatisfactory conditions have been corrected.
   1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
   1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
   2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

D. Interior Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
   3. Sand surfaces that will be exposed to view and dust off.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
   1. Use applicators and techniques suited for finish and substrate indicated.
   2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
   3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.
3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Wood substrates, nontraffic surfaces.
   1. Polyurethane Varnish over Stain System:
      a. Stain Coat: Stain, semi-transparent, for interior wood, MPI #90.
      d. Topcoat: Varnish, interior, polyurethane, oil-modified, satin (Gloss Level 4), MPI #57.

END OF SECTION
SECTION 10 14 23 - PANEL SIGNAGE

GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions apply to this Section.

1.2 SUMMARY
   A. Section Includes:
      1. ADA compliant restroom signs at large guest restrooms only.
      2. Exterior room-signage at storage rooms and bunkrooms.
      3. Panel signage at storage rooms & bunkrooms.
      4. Coordinate with Owner and Architect, size, style and color.

1.3 DEFINITIONS
   A. Accessible: In accordance with the accessibility standard. C

1.4 COORDINATION
   A. Furnish templates for placement of sign-anchorage devices embedded in permanent
      construction by other installers.
   B. Furnish templates for placement of electrical service embedded in permanent
      construction by other installers.

1.5 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Samples for Initial Selection: For each type of sign assembly, exposed component, and
      exposed finish.
      1. Include representative Samples of available typestyles and graphic symbols.
   C. Sign Schedule: 8.25"x8" BIG PlanSign Series with mounting capabilities from Building
      Image Group
         Casa Este: Basis of Design-
         Exterior room sign-101, 103, 105, 107, MER 109

         Casa Grande: Basis of Design- 8.25"x8" BIG PlanSign Series with mounting
         capabilities from Building Image Group
         ADA compliant restroom sign- four (4) signs
         Exterior room sign- 201, 205, 208, 209, 210
         Interior room sign- 205 & 208

PRODUCTS
   D. Room-Identification Sign with smooth, uniform surfaces; with message and characters
      having uniform faces, sharp corners, and precisely formed lines and profiles; and as
      follows:
      1. Laminated-Sheet Sign: Sandblasted polymer face sheet with raised graphics
         laminated over subsurface graphics to acrylic backing sheet to produce composite
         sheet.
         a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
c. Color(s): As selected by Architect from manufacturer's full range.

   a. Edge Condition: Square cut.
   b. Corner Condition in Elevation: Rounded to radius.

3. Mounting: Surface mounted to wall with concealed anchors.

4. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.

5. Acceptable Manufacturer's:
   a. Grainger Specialties LLC, Texas 325-725-2003
   b. BIG Building Image Group Incorporated, Texas, 512-494-1466
   d. Substitutions are acceptable.

1.6 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.

1.7 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
   1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.

B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.
   1. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.

EXECUTION

1.8 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

1.9 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions and TAS requirements.
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Room-Identification Signs according to accessibility standard.

C. Mounting Methods:
   1. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.

1.10 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION
SECTION 10 21 13.19 - TOILET & SHOWER COMPARTMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including Uniform General and Supplementary Conditions apply to this section.

1.02 SUMMARY
A. This Section includes toilet compartments and screens as follows:
   2. Screen Style: Wall hung.
   3. Fire Rated Class A, NFPA 286
B. Related Sections include the following:
   1. Division 6 "Rough Carpentry" for concealed in-wall blocking.
   2. Division 10 "Toilet Accessories" for toilet tissue holders, grab bars and similar accessories.

1.03 PERFORMANCE REQUIREMENTS
A. Graffiti Resistance: partition material shall have the following graffiti removal characteristics when tested in accordance with ASTM D6578-00 Standard Practice for Determination of Graffiti Resistance in accordance with Section 9, "Graffiti Removal Procedure Using manual Solvent Rubs":
   1. Cleanability: Five (5) required staining agents shall be cleaned off material.
B. Scratch Resistance: Partition material shall have the following when tested in accordance with ASTM D2197-98(2002) Standard Test Methods for Adhesion of Organic Coating by Scraping Adhesion, using Gardner Stock #PA-2197/ST pointed stylus attachment on scrape tester:
   1. Scratch Resistance: Maximum Load Value shall exceed 10 kilograms.
C. Impact Resistance: Partition material shall have the following when tested in accordance with ASTM D2794-93 (1999)e1 Standard Test Method for Resistance of Organic Coating to the Effects of Rapid Deformation (Impact), using .625" hemispherical indenter with 2-lb impact weight:
   1. Impact Resistance: Maximum Impact Force value shall exceed 30 inch-lbs.
D. Fire Resistance: Partition material shall have the following when tested in accordance with ASTM 84: Standard Test Method for surface Burning Characteristics of Building Materials.
   1. Smoke development Index: Not to exceed 450
   2. Flame Spread Index: Not to exceed 25
   3. Material Fire Ratings:
      a. National Fire Protection Association (NFPA): Class A.
E. USA Certificate of Origin: Manufacturer shall supply with first submittal, an example of their Certificate of Origin declaring toilet compartments are wholly manufactured and assembled specifically in the United States, including city and state locations. A notarized Certificate of Origin shall be provided with closeout documents.
1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract.

B. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

C. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.
   1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

D. Samples for Initial Selection: Manufacturer's color charts consisting of sections of actual units showing the full range of colors, textures, and patterns available for each type of compartment or screen indicated.

E. Samples for Verification: Of each compartment or screen color and finish required, prepared on 6-inch- (150-mm-) square Samples of same thickness and material indicated for Work.

1.05 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

1.06 WARRANTY

A. Furnish manufacturer's 25 year warranty against breakage, corrosion, and delamination under normal conditions.

B. Manufacturer's Warranty (SierraSeries and DuraLineSeries): Manufacturer's standard 25 year limited warranty for panels, doors, and stiles against breakage, corrosion, delamination, and defects in factory workmanship. Manufacturer's standard 1 year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design: Solid Color Reinforced Composite (SCVRC) toilet partitions as manufactured by Bobrick SierraSeries.

B. Solid Color Reinforced Composite (SCRC) Toilet Partitions:
   Design Type:
   A. Standard Height.
1. Door/Panel Height: 58 inches (147 cm).
2. Floor Clearance: 12 inches (30 cm).

B. Maximum Height.
1. Door/Panel Height: 72 inches (183 cm).
2. Floor Clearance: 4 inches (10 cm).
3. Privacy Style Partitions: No sightlines with gap-free interlocking doors and stiles routed 0.300 inches (7.6 mm) from the edge to allow for 0.175 inch (4.4 mm) overlap to prevent line-of-sight into the toilet compartment. Privacy strips fastened or adhered onto the partition material are not acceptable.

Mounting:
C. Floor-mounted.
1. Stile Standard Height: 69 inches (175 cm); stile Maximum Height: 75-5/16 inches (194 cm).

D. Floor-mounted, overhead-braced with satin finish, extruded anodized aluminum headrails, 0.065 inch (1.65 mm) thick with anti-grip profile.
1. Stile Maximum Height: 83 inches (211 cm).

E. Floor-to-ceiling.
1. Stile Height: As required, 10 feet 0 inches (305 cm) maximum.

F. Ceiling-hung.
Stile Height: 8 feet 0 inches (244 cm) or as required 10 feet 0 inches

G. Substitutions: Other manufacturers may be submitted for evaluation by the architect by following the conditions of the substitutions clause.

2.02 MATERIALS

A. Doors, Panels and Pilasters:
1. Solid Core Color Reinforced Composite (SCRC) fabricated dyes, organic fibrous material, and polycarbonate/phenolic resins.
2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
3. 1 inch thick with edges rounded to 1/4 inch radius.
4. Recycled content: Minimum 25 percent.
5. Color: As selected by Architect from manufacturer's full range of colors. Basis of Design: Desert Beige (sc02)

B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

C. Stainless Steel: ASTM A167, Type 304.

2.03 HARDWARE

A. Hinges:
1. Continuous, spring-loaded type, full height, fabricated from heavy-duty stainless steel with bright polished finish, wrap-around flanges, adjustable on 30-degree increments, through bolted to doors and pilasters with stainless steel, Torx head sex bolts.
2. Hinges operate on field-adjustable nylon cams, field adjustable in 30 degree increments.

B. Door Strike and Keeper:
1. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.

2. Bumper: Extruded black vinyl.

C. Latch and Housing:
   1. Heavy-duty extruded aluminum.
   2. Latch housing: Bright dip anodized finish.
   3. Slide bolt and button: Black anodized finish.

D. Coat Hook/Bumper:
   1. Combination type, chrome plated Zamak.
   2. Equip outswing handicapped doors with second door pull and door stop.

E. Door Pulls: Chrome plated Zamak.

2.04 COMPONENTS

A. Doors and Dividing Panels: 55 inches high, mounted 14 inches above finished floor, with aluminum heat-sink fastened to bottom edges.

B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.

C. Pilaster Sleeves: 3 inches high, 20 gage stainless steel, secured to pilaster with stainless steel tamper resistant Torx head sex bolt.

D. All Brackets: 54 inches long, heavy-duty aluminum, bright dip anodized finish, fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.

E. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.

F. Headrail Brackets: 20 gage stainless steel, satin finish, secured to wall with stainless steel tamper resistant Torx head screws.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level.

B. Floor-Anchored Overhead-Braced Compartments: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.

C. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.
3.02 ADJUSTING AND CLEANING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION
SECTION 10 28 00 - TOILET AND BATH ACCESSORIES

GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section Includes:
      1. Restroom accessories. Refer to Toilet Accessory Schedule in drawings.
      2. Mirrors
      3. Under lavatory guards.

   B. Related Sections:
      1. Section 08 "Mirrors" for frameless mirrors.
      2. Section 06 "Rough Carpentry" for blocking.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated. Include the following:
      1. Construction details and dimensions.
      2. Anchoring and mounting requirements, including requirements for cutouts in other
         work and substrate preparation.
      3. Material and finish descriptions.
      4. Features that will be included for Project.
      5. Manufacturer's warranty.

   B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room
      of each accessory required.
      1. Identify locations using room designations indicated.
      2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS
   A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE
   A. Source Limitations: For products listed together in the same Part 2 articles, obtain
      products from single source from single manufacturer.

1.7 COORDINATION
   A. Coordinate accessory locations with other work to prevent interference with clearances
      required for access by people with disabilities, and for proper installation, adjustment,
      operation, cleaning, and servicing of accessories.

   B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent
      delaying the Work.
1.8 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 15 years from date of Substantial Completion.

PRODUCTS

1.9 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

1.10 BASIS-OF-DESIGN

A. Subject to compliance with requirements, provide product indicated on Drawings or these specifications with a comparable product by one of the following:
   1. Bobrick Washroom Equipment, Inc.
   2. American Specialties, Inc.
   4. Pre-approved equal.

1.11 CHAPARRAL BUNKHOUSES

A. Toilet Tissue (Roll) Dispenser:
   2. Description: Double-roll dispenser.
   5. Capacity: Designed for 4-1/2- or 5-inch-diameter tissue rolls.

B. Grab Bar:
   3. Material: Stainless steel, 0.05 inch thick.
      a. Finish: Smooth, No. 4 finish (satin).
   5. Configuration and Length: As indicated on Drawings.

C. Clothes Hook:

D. Straight Heavy Duty Shower Curtain Rod:
2. Description: 1-inch OD; fabricated from nominal 0.0375-inch thick stainless steel.
4. Finish: Stainless steel, No. 4 finish (satin).

E. Shower Curtain:
1. Basis of Design: standardtextile, hookless plastic
2. Sizes: 48"W x 72"H @Casa Este & 36"W x 72"H@ Casa Grande
   Color: to be selected by Architect

F. Reversible Folding Shower Seats
2. Compliance: Universal/accessibility design, including ADA-ABA and ICC/ANSI. for structural strength; clearance between back of shower seat and wall is 1-1/2 inches
   a. Capacity: Designed to support 360 lbs in compliant installations.
3. Seat: One-piece, 1/2 inch thick, solid phenolic with matte-finish, ivory-colored, melamine surfaces and black phenolic-resin core, integral slots for water drainage; secured to frame with stainless steel carriage bolts and acorn nuts, reversible for left-or right-hand installation in the field. Folds against wall when not in use.
4. Seat Supports: Do not come into contact with floor.
5. Frame: 18-8, Type 304 stainless steel with satin finish; 16 gauge, 1-1/4 inch square members, 18 gauge 1 inch diameter tubing.
6. Mounting Flanges: 18-8, Type 304, 3/16 inch thick stainless steel with satin finish; 3 inch diameter with three mounting screw holes.
7. Baseplate: 18-8, Type 304, heavy gauge stainless steel.
8. Spring: 17-7, Type 301, 24 gauge stainless steel, spot-welded to baseplate. Holds seat against wall.

G. Mirrors:
1. Basis of Design: Bobrick B-165, 24"x36"
2. Mounting: Surface mounted
3. Material and Finish: Stainless steel channel, No.4 finish (satin)

1.12 UNDERLAVATORY GUARDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Plumberex Specialty Products, Inc.
   2. Truebro by IPS Corporation.

B. Underlavatory Guard G-1:
   1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.

1.13 CUSTODIAL ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

B. Utility Shelf with Mop and Broom Holder MH-1:
   2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
   3. Size: 24 inches long by 8 inches deep.
   5. Mop/Broom Holders: Four spring-loaded, rubber hat, cam type
   6. Material and Finish: Not less than nominal 0.05-inch- thick stainless steel, No. 4 finish (satin).

1.14 FABRICATION
   A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

EXECUTION

1.15 INSTALLATION
   A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
   B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

1.16 ADJUSTING AND CLEANING
   A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
   B. Remove temporary labels and protective coatings.
   C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION
SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section includes portable, hand-carried fire extinguishers.
   B. Related Sections:
      1. Division 6 Section "Rough Carpentry."

1.3 SUBMITTALS
   A. Product Data: For each type of product indicated. Include rating and classification,
      material descriptions, dimensions of individual components and profiles, and finishes for
      fire extinguisher.
   B. Operation and Maintenance Data: For fire extinguishers to include in maintenance
      manuals.
   C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE
   A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10,
      "Portable Fire Extinguishers."
   B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an
      independent testing agency acceptable to authorities having jurisdiction.
      1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 COORDINATION
   A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure
      fit and function.

1.6 WARRANTY
   A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair
      or replace fire extinguishers that fail in materials or workmanship within specified
      warranty period.
      1. Failures include, but are not limited to, the following:
         a. Failure of hydrostatic test according to NFPA 10.
         b. Faulty operation of valves or release levers.
      2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Fire Extinguishers, Cabinets and Accessories.
      1. Manufacturers: Subject to compliance with requirements, available manufacturers
         offering products that may be incorporated into the Work include, but are not limited
         to, the following:
         b. Larsen's Manufacturing Company.
         c. Potter Roemer LLC.

   2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

2.2 FIRE extinguishers

   A. Type 3A, 40BC, Cosmic 5”.

2.3 FIRE EXTINGUISHER CABINETS

   A. Type: JL Industries’ Cosmopolitan Series, Model #1037
      1. Cabinet Configuration: Semi-recessed type, 2 ½” rolled edged.
      2. Cabinet Mounting Hardware: appropriate to cabinet. Pre-drill anchors.
      3. Finish of Cabinet Exterior Trim and Door: Polished Stainless Steel.

2.4 ACCESSORIES

   A. Fire Extinguisher Bracket

PART 3 - EXECUTION

3.1 EXAMINATION

   A. Examine fire extinguishers for proper charging and tagging.
      1. Remove and replace damaged, defective, or undercharged fire extinguishers.

   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

   A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION
SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 - RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and Division 01 Specification Sections, apply to this Section.

1.2 - SUMMARY
   A. Section Includes:
      2. Kitchen exhaust ventilation.

1.3 - ACTION SUBMITTALS
   A. Product Data: For each type of product indicated. Include rated capacities, operating
      characteristics, dimensions, furnished accessories, and finishes for each appliance.

1.4 - CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For each residential appliance to include in operation
      and maintenance manuals.

1.5 - QUALITY ASSURANCE
   A. Regulatory Requirements: Comply with the following:
      1. UL: Provide electrical appliances listed and labeled as approved by UL.

1.6 - WARRANTY
   A. Warranties: Provide Manufacturer's standard form in which manufacturer agrees to repair
      or replace residential appliances or components that fail in materials or workmanship
      within specified warranty period.

PART 2 - PRODUCTS

1.1 - RANGES
   A. Chaparral Bunkhouse Electric Range Slide-in range with one oven and complying with
      UL.
      1. Basis-of-Design Product: General Electric “Profile” series, model number
         PS920SFSS, or pre-approved equal.

1.2 - MICROWAVE OVENS
   A. Chaparral Bunkhouse Microwave Oven
      1. Basis-of-Design Product: General Electric, model number WPEB7226SFSS, or pre-
         approved equal..

1.3 - REFRIGERATOR/FREEZERS
   A. Chaparral Bunkhouse Refrigerator/Freezer Three-door
      1. Basis-of-Design Product: General Electric “Profile” series model number
         GNE29GSKSS, or pre-approved equal.
1.4 - DISHWASHERS

A. Chaparral Bunkhouse Dishwasher: Complying with UL.
   1. Basis-of-Design Product: General Electric, model number GDT535PSJSS, or pre-approved equal.

1.5 - GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

1.1 - EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.

C. Examine walls, ceilings, and roofs for suitable conditions where microwave ovens with vented exhaust fans will be installed.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

1.2 - INSTALLATION, GENERAL

A. General: Comply with manufacturer’s written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Range Anti-Tip Device: Install at each range according to manufacturer’s written instructions.

E. Utilities: Comply with plumbing and electrical requirements.

1.3 - FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers’ written recommendations. Certify compliance with each manufacturer’s appliance-performance parameters.
   2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
   3. Operational Test: After installation, start units to confirm proper operation.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
B. An appliance will be considered defective if it does not pass tests and inspections.
SECTION 12 21 13 - HORIZONTAL FAUX WOOD BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including Uniform General and Supplementary Conditions and Division-1 Specification sections, apply to this section.

1.2 SUMMARY
A. This Section specifies horizontal louver blinds to be installed at:
   1. At all exterior windows, location shown on drawings.

1.3 SUBMITTALS
A. Product Data: Submit manufacturer's specifications and installation instructions for each type of window treatment unit required. Include methods of installation for each type of opening and supporting structure.
B. Samples: For initial selection purposes, submit color samples of each component, material and finish which will be exposed to view.
C. Samples: For verification purposes, submit samples of each component, material and finish which will be exposed to view, for each type of window treatment required. Prepare samples from same materials to be used for the work.

1.4 QUALITY ASSURANCE
A. General: Provide window treatment units which are complete assemblies produced by one manufacturer for each type required, including hardware, accessory items, mounting brackets, and fastenings.

PART 2 - PRODUCTS

2.1 HORIZONTAL BLINDS
A. Headrail: U-shaped profile with rolled edges, constructed of corrosion resistant steel and providing a sleek low profile design. Internally fit with components required for specified performance and designed for smooth, quiet, trouble-free operation. Headrail finish to be standard baked-on polyester and to coordinate with slats. End caps fitted on headrail for a clean product appearance.
B. Bottom Rail: Tubular steel bottom rail, designed to withstand twisting or sagging.
C. Slats: 2" wide x 0.105" thick durable PVC. Furnish to ensure tight closure and light control. Finish with manufacturer's standard colors selected by architect from manufacturer's available contract colors, similar to espresso.
D. Ladders: Ladder construction designed to support and maintain slats at proper spacing and alignment in open and closed positions, braided polyester cord consisting of vertical components of 0.043" - 0.068" diameter.
E. Tilting Mechanism: Assembly including disengaging worm and gear mechanism to eliminate overdrive, low friction gear tilter, drum and cradle at each ladder, tilt rod, tape clips, and grommet guides to prevent wear on ladder and cords; designed to hold slats at any angle and prevent movement of slats due to vibration, operated with detachable clear plastic wand.
F. Lifting Mechanism: Standard type including crash-proof cord locks with cord separators and braided polyester or nylon lift cords with tassels at ends. Size cord to suit blind type.

G. Side Channels: Provide side channels identical in appearance to headrail and designed to reduce light leakage at edges of blinds.

H. Finish: Steel Components - Baked-on synthetic resin enamel finish.

2.2 FABRICATION AND OPERATION

A. Non-corrosive, non-staining, non-fading materials which are completely compatible with each other, and which do not require lubrication during normal expected life.

B. Fabricate blind units to completely fill the openings as shown, from head-to-sill and jamb-to-jamb.

C. For continuous window wall installations, fabricate blinds so that ends occur only over mullions or other defined vertical separation.

D. Space slats to provide overlap for light exclusion when in fully closed position.

E. Equip horizontal blind units, for full-tilting operation with slats rotating approximately 180 degrees. Full-height raising, with lifting cord locks for stopping blind at any point of ascending or descending travel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install window treatment units in manner indicated to comply with manufacturer’s instructions. Position units level, plumb, secure, at proper height and location relative to adjoining window units and other related work. Securely anchor units with proper clips, brackets, anchorages, suited to type of mounting indicated.

B. Provide adequate clearance between sash and blinds to permit unencumbered operation of sash hardware.

C. Isolate metal parts from concrete and mortar to prevent galvanic action. Use tape or thick coating or other means recommended by manufacturer to effect separation.

D. Protect installed units to ensure their being in operating condition, without damage, blemishes, or indication of use at completion of project. Repair or replace damaged units as directed by Architect.

END OF SECTION
SECTION 22 05 03 - PIPES AND TUBES FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Pipe and pipe fittings for the following systems:
   1. Domestic water piping.
   2. Sanitary sewer piping.
   3. Equipment drains and over flows.
   4. Unions and flanges.
   5. Underground pipe markers.

1.2 SUBMITTALS

A. Shop Drawings: Indicate layout of piping systems, including equipment, critical dimensions, and sizes.

B. Product Data: Submit data on pipe materials and fittings. Submit manufacturers catalog information.

C. Test procedures:
   1. Submit plan for testing sanitary piping.
   2. Submit plan for disinfecting potable water system. – Potable water test to be performed at testing facility chosen by the owner.

D. Welders’ Certificate: Include welders’ certification of compliance with ASME Section IX.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.
B. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.6 ENVIRONMENTAL REQUIREMENTS
   A. Do not install underground piping when bedding is wet or frozen.

1.7 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

1.8 COORDINATION
   A. Coordinate installation of buried piping with trenching.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING, BURIED
   A. Refer to Schedule on Drawings.
   B. PVC water pipe shall bear NSF seal of approval.

2.2 DOMESTIC WATER PIPING, ABOVE GRADE
   A. Refer to Schedule on Drawings.
   B. PVC water pipe shall bear NSF seal of approval.

2.3 SANITARY SEWER PIPING, BURIED
   A. Refer to Schedule on Drawings.

2.4 SANITARY SEWER PIPING, ABOVE GRADE
   A. Refer to Schedule on Drawings.

2.5 EQUIPMENT DRAINS AND OVERFLOWS
   A. Refer to Schedule on Drawings.

2.6 UNIONS AND FLANGES
   A. PVC Pipe Materials: For connections to equipment and valves with threaded connections, furnish solvent-weld socket to screwed joint adapters and unions, or ASTM D2464, Schedule 80, threaded, PVC pipe.
2.7 UNDERGROUND PIPE MARKERS

A. Detectable Warning Tape: Bright colored, magnetic detectable, continuously printed, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service, imprinted with "Domestic Water Service" or "Sewer Service" in large letters.

2.8 BEDDING AND COVER MATERIALS

A. Bedding: Fine granular fill.

B. Soil Backfill from Above Pipe to Finish Grade: Material from excavation. Subsoil shall not contain rocks over 6 inches in diameter, frozen earth or foreign matter. Refer to detail on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

B. Verify trenches are ready to receive piping.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection to existing piping system size, location, and invert.

B. Establish elevations of buried piping with not less than two feet of cover.

C. Establish minimum separation of three from other services piping.

D. Excavate pipe trench.

E. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches compacted depth; compact to 95 percent maximum density.

F. Install pipe on prepared bedding.
G. Route pipe in straight line.

H. Install pipe to allow for expansion and contraction without stressing pipe or joints.

I. Install plastic ribbon tape continuous over top of pipe when cast iron is used. Install detectable warning tape over top of pipe above non-metallic pipe line.

J. Pipe Cover and Backfilling:
   1. Backfill trench.
   2. Maintain optimum moisture content of fill material to attain required compaction density.
   3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches compacted layers to 6 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
   4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
   5. Do not use wheeled or tracked vehicles for tamping.

K. All slab penetrations shall be sleeved with minimum 16 gauge galvanized steel, fire and water stopped, and extending to 2" above the slab.

L. Sleeve foundation beam penetrations with sch. 40 steel pipe sleeve of 2" larger diameter.

3.4 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

B. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.

C. Group piping whenever practical at common elevations.

D. Sleeve pipe passing through partitions, walls and floors.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

G. Provide access where valves and fittings are not accessible.

H. Install non-conducting dielectric connections wherever jointing dissimilar metals.

I. Slope piping and arrange systems to drain at low points.
J. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

K. Install piping penetrating roofed areas to maintain integrity of roof assembly.

L. Install valves.

M. Install piping specialties.

N. Insulate piping.

O. Install pipe identification.

3.5 INSTALLATION - DOMESTIC WATER PIPING SYSTEMS

A. Install domestic water piping system in accordance with ASME B31.9, local codes and authority having jurisdiction.

3.6 INSTALLATION - SANITARY WASTE AND VENT PIPING SYSTEMS

A. Install sanitary waste and vent piping systems in accordance with ASME B31.9.

B. Install bell and spigot pipe with bell end upstream.

C. Support hub and spigot cast iron drainage piping at every joint. Support hub-less cast iron drainage piping on both sides of every joint, within 12 inches of the joint.

D. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.

3.7 FIELD QUALITY CONTROL

A. Test domestic water piping system in accordance with ASME B31.
   1. Provide temporary equipment for testing, including pump and gages. Test piping systems before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.
      a. Required test periods are 2 hours each.
      b. Test each piping system at 150% of operating pressure indicated, but not less than 125 psi test pressure.
      c. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure

B. Test sanitary waste and vent piping system in accordance with local authority having jurisdiction.
   1. Fill sanitary piping with water for two hours under atmospheric pressure.
a. Observe each test section for leakage at end of test period. Test fails if leakage is observed.

C. Repair piping systems sections which fail required piping test, by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

3.8 CLEANING

A. Clean and disinfect domestic water distribution system prior to final completion per AWWA C651-05.

B. Provide water sample of disinfected water to testing agency of the owners choosing for verification of potable water disinfection. Provide test upon completion of each phase.

END OF SECTION
SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Ball valves.

1.2 REFERENCES

A. ASTM International:

B. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
   2. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
   3. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
   4. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

A. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

A. For drinking water service, provide valves complying with NSF 61.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install valves underground when bedding is wet or frozen.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers:
   1. Crane Valve, North America
   2. Apollo Valve
   3. Hammond Valve
   4. Milwaukee Valve Company
   5. NIBCO, Inc.
   6. Stockholm Valves & Fittings
   7. DeZURIK, Unit of SPX Corp.
   8. Flow Control Equipment, Inc. Model
   9. Homestead Valve Model

2.2 BALL VALVES

A. 2 inches and Smaller: MSS SP 110, 400 psi WOG, two piece bronze body, chrome plated brass ball, full port, teflon seats, blow-out proof stem, solder ends or threaded ends with union, lever handle.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify piping system is ready for valve installation.

3.2 INSTALLATION

A. Install valves with stems upright or horizontal, not inverted.
B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
C. Install 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
D. Install valves with clearance for installation of insulation and allowing access.
E. Provide access where valves and fittings are not accessible.

3.3 VALVE APPLICATIONS

A. Install shutoff valves at locations indicated on Drawings in accordance with this Section.
B. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install ball or butterfly valves in domestic water systems for shut-off service.

END OF SECTION
SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe hangers and supports.
   2. Hanger rods.
   3. Inserts.
   4. Flashing.
   5. Sleeves.
   6. Mechanical sleeve seals.
   7. Formed steel channel.

1.2 SUBMITTALS

A. Product Data:
   1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.4 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
   1. Carpenter & Paterson Inc.
   2. Creative Systems Inc.
   3. Flex-Weld, Inc.
   4. Glope Pipe Hanger Products Inc.
   5. Michigan Hanger Co.
   7. Substitutions: Engineer approved equal.
B. Plumbing Piping - DWV:
   1. Conform to ASME B31.9 and MSS SP58.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
   4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
   8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   9. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.

C. Plumbing Piping - Water:
   1. Conform to ASME B31.9 MSS SP58.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
   5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
   7. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
   8. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
  10. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  11. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
2.4 FLASHING

A. Metal Flashing: 26 gage thick galvanized steel.

B. Metal Counterflashing: 22 gage thick galvanized steel.

C. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

D. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.5 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

C. Sealant: Acrylic.

2.6 MECHANICAL SLEEVE SEALS

A. Manufacturers:
   1. Thunderline Link-Seal, Inc.
   2. NMP Corporation.
   3. Substitutions: Engineer approved equal.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.7 FORMED STEEL CHANNEL

A. Manufacturers:
   1. Allied Tube & Conduit Corp.
   4. Unistrut Corp.
   5. Substitutions: Engineer approved equal.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.
3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install damming materials to arrest liquid material leakage.

D. Obtain permission from Architect/Engineer before using powder-actuated anchors.

E. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.3 INSTALLATION - INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASME B31.5, ASME 31.9 and MSS SP 58.

B. Support horizontal piping as scheduled.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1-1/2 inch minimum vertical adjustment.

F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

G. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
H. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

I. Support riser piping independently of connected horizontal piping.

J. Provide sheet lead packing between hanger or support and piping.

K. Design hangers for pipe movement without disengagement of supported pipe.

L. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

M. Provide clearance in hangers and from structure and other equipment for installation of insulation.

3.5 INSTALLATION - FLASHING

A. Provide flexible flashing and metal counterflashing where piping penetrates weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

D. Seal floor and mop sink drains watertight to adjacent materials.

E. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.6 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 2 inch above finished floor level. Caulk sleeves.

E. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with firestopping insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
F. Install chrome plated steel escutcheons at finished surfaces.

3.7 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION
SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Tags.
   3. Stencils.
   4. Pipe markers.
   5. Ceiling tacks.
   7. Lockout devices.

1.2 SUBMITTALS

A. Product Data: Submit manufacturers catalog literature for each product required.

B. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.4 QUALITY ASSURANCE

A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

B. Installer: Company specializing in performing Work of this section with minimum three years' experience.
1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Manufacturers:
   1. Craftmark Identification Systems
   2. Safety Sign Co.
   3. Seton Identification Products

B. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS

A. Plastic Tags:
   1. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches square.

B. Metal Tags:
   1. Brass or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges.

C. Information Tags:

D. Tag Chart: Typewritten letter size list of applied tags and location plastic laminated.

2.3 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
   1. Up to 2 inches Outside Diameter of Insulation or Pipe: 1/2 inch high letters.
   2. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1-inch high letters.
   3. Ductwork and Equipment: 3 inches high letters.


2.4 PIPE MARKERS


B. Plastic Pipe Markers:
1. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

C. Plastic Tape Pipe Markers:
   1. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.5 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color-coded head.

B. Color code as follows:
   1. Plumbing valves: Green.

2.6 LABELS

A. Description: Laminated Mylar, size 1.9 x 0.75 inches, adhesive backed with printed identification.

2.7 LOCKOUT DEVICES

A. Lockout Hasps:
   1. Reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces for stencil painting.

3.2 INSTALLATION

A. Install identifying devices after completion of coverings and painting.

B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.

C. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.

D. Install tags using corrosion resistant chain. Number tags consecutively by location.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
F. Identify control panels and major control components outside panels with plastic nameplates.

G. Identify valves in main and branch piping with tags.

H. Identify piping, concealed or exposed, with plastic pipe markers, plastic tape pipe markers, or stenciled painting. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

I. Provide ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION
SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plumbing piping insulation, jackets and accessories.
   2. Plumbing equipment insulation, jackets and accessories.

1.2 SUBMITTALS

A. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.

B. Manufacturer's Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years’ experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years’ experience approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.
1.6 ENVIRONMENTAL REQUIREMENTS

A. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.

B. Maintain temperature before, during, and after installation for minimum period of 24 hours.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturers for Glass Fiber and Mineral Fiber Insulation Products:
   1. CertainTeed.
   2. Knauf.
   4. Owens-Corning.
   5. Substitutions: with engineer approval

B. Manufacturers for Closed Cell Elastomeric Insulation Products:
   2. Armacell, LLC. Armaflex.
   4. Substitutions: with engineer approval

C. Manufacturers for Extruded Polystyrene Insulation Products:
   1. Dow Chemical Company.
   2. Substitutions: with engineer approval

2.2 PIPE INSULATION

A. Refer to Schedule on Drawings.

2.3 PIPE INSULATION JACKETS

A. Refer to Schedule on Drawings.

2.4 PIPE INSULATION ACCESSORIES

A. Vapor Retarder Lap Adhesive: Compatible with insulation.

B. Covering Adhesive Mastic: Compatible with insulation.
C. Piping 1-1/2 inches diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.

D. Piping 2 inches diameter and larger: Wood insulation saddle, hard maple. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.


F. Insulating Cement: ASTM C195; hydraulic setting on mineral wool.

G. Adhesives: Compatible with insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify piping and equipment has been tested before applying insulation materials.

B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING SYSTEMS

A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.

B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions.

C. Piping Systems Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
   2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
   3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.

D. Glass Fiber Board Insulation:
   1. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
2. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.
3. Cover wire mesh or bands with cement to a thickness to remove surface irregularities.

E. Extruded Polystyrene Insulation:
1. Wrap elbows and fitting with vapor retarder tape.
2. Seal butt joints with vapor retarder tape.

F. Hot Piping Systems less than 140 degrees F:
1. Furnish factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
3. Do not insulate unions and flanges at equipment, but bevel and seal ends of insulation at such locations.

G. Inserts and Shields:
1. Piping 1-1/2 inches Diameter and Smaller: Install galvanized steel shield between pipe hanger and insulation.
2. Piping 2 inches Diameter and Larger: Install insert between support shield and piping and under finish jacket.
   a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
   b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.
3. Piping Supported by Roller Type Pipe Hangers: Install galvanized steel shield between roller and inserts.

H. Insulation Terminating Points:
1. Coil Branch Piping 1 inch and Smaller: Terminate hot water piping at union upstream of the coil control valve.
2. Chilled Water Coil Branch Piping: Insulate chilled water piping and associated components up to coil connection.
3. Condensate Piping: Insulate entire piping system and components to prevent condensation.

I. Closed Cell Elastomeric Insulation:
1. Push insulation on to piping.
2. Miter joints at elbows.
3. Seal seams and butt joints with manufacturer's recommended adhesive.
4. When application requires multiple layers, apply with joints staggered.
5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.

J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
K. Piping Exterior to Building: Provide vapor retarder jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor retarder cement. Cover with aluminum jacket with seams located at 3 or 9 o’clock position on side of horizontal piping with overlap facing down to shed water or on bottom side of horizontal piping.

L. Buried Piping: Insulate only where insulation manufacturer recommends insulation product may be installed in trench, tunnel or direct buried. Install factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with 1 mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.

M. Prepare pipe insulation for finish painting.

END OF SECTION
SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Water closets.
   2. Urinals.
   3. Lavatories.
   4. Sinks.
   5. Service sinks.
   7. Drinking fountains.
   8. Wash fountains.

1.2 SUBMITTALS

A. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

B. Manufacturer's Installation Instructions: Submit installation methods and procedures.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit fixture, trim, exploded view and replacement parts lists.

1.4 QUALITY ASSURANCE

A. Provide products requiring electrical connections listed and classified by Underwriters Laboratories Inc., as suitable for purpose specified and indicated.

B. Provide plumbing fixture fittings in accordance with ASME A112.18.1 that prevent backflow from fixture into water distribution system.

C. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 200 miles of Project.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.7 EXTRA MATERIALS

A. Furnish one sets of faucet washers, flush valve service kit, lavatory supply fittings and toilet seat.

PART 2 - PRODUCTS

2.1 FLUSH VALVE WATER CLOSETS

A. Manufacturers:
   1. PROFLO
   2. Sloan
   3. Kohler
   4. American Standard
   5. Substitutions: With Engineer Approval

B. Refer to Schedule on Drawings.

2.2 WALL HUNG URINALS

A. Manufacturers:
   1. PROFLO
   2. Sloan
   3. Kohler
   4. American Standard
   5. Substitutions: With Engineer Approval

B. Refer to Schedule on Drawings.

2.3 LAVATORIES

A. Manufacturers:
   1. PROFLOW
   2. Kohler
   3. Mirabelle
   4. American Standard
   5. Chicago
   6. Substitutions: With Engineer Approval

B. Refer to Schedule on Drawings.
2.4 ELECTRIC WATER COOLERS

A. Manufacturers:
   1. Elkay
   2. Substitutions: With Engineer Approval
   3. Refer to Schedule on Drawings.

2.5 SERVICE SINKS (MOP SINKS)

A. Refer to Schedule on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify electric power is available and of correct characteristics.

C. Confirm millwork is constructed with adequate provision for installation of counter top lavatories and sinks.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and/or wall carriers and bolts.

E. Seal fixtures to wall and floor surfaces with sealant, color to match fixture.

F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

G. For ADA accessible water closets, install flush valve with handle to wide side of stall.

H. Insulate exposed lavatory p-traps to meet ADA requirements.

I. All plumbing equipment connections shall be made with unions or valves so that the connected equipment can be removed without obstruction.
3.4 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and installation.

3.5 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

A. Clean plumbing fixtures and equipment.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Do not permit use of fixtures before final acceptance.

END OF SECTION
SECTION 23 00 00 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements that expand the requirements specified in Uniform General Conditions and applies to all Division 23 – Heating, Ventilating, and Air-Conditioning (HVAC) Specification Sections. It is the intent of the contract documents to provide an installation complete in every respect. Work shall be executed in a workmanlike manner and shall include all labor, materials, and supervision essential to provide complete functioning systems as described in the contract documents. In the event that additional details or special construction is required for work indicated, it shall be the responsibility of the contractor to provide same as well as to provide material and equipment usually furnished with such systems or required to complete the installation at no expense to the owner.

B. If any duplication between this section and the Uniform General Conditions, including Supplementary General Conditions plus the General Requirements of Division 1, Section 01000 arise, the UGC and Division 1 specifications shall take precedent.

C. Conflict Resolution: Where conflicts may exist between the minimum requirements of various laws, codes, authorities, and/or within the Contract Documents, the higher quality, greater quantity, more restrictive and/or more expensive requirement shall be the basis of Contractor pricing and the Contractor shall notify the Engineer and Texas Parks & Wildlife Department staff for the resolution of the issue prior to executing the work in question.

D. Should any errors, omissions, conflicts, or ambiguities exist in the drawings, the contractor shall bring these to the attention of the engineer immediately for adjustment in writing prior to submitting a bid or proceeding with the work. Otherwise, he shall at his own expense, supply the proper materials and labor to make good any damage or defect caused by such unintentional error.

E. Contractor is responsible for checking all contract documents, field conditions and dimensions for accuracy, and confirming that the work is buildable as shown and meets all applicable codes before proceeding with construction. If there are any questions regarding these or other coordination issues, the contractor is responsible for obtaining a clarification from the Engineer before proceeding with the work in question or related work.

F. Contractor shall direct all questions to the owner's Project Manager. The contractor shall verify all working conditions such as starting time, noise and vibration limitations, confined space, etc. Through the project coordinator and approval shall be received to start work.

G. Field Conditions: The contractor is responsible for visiting the jobsite and verifying the scope of work required including all existing conditions, locations, dimensions,
and quantities as shown and noted on the drawings and the extent and effect of existing systems. The contractor shall be responsible for field verification of existing conditions, and shall perform field measurements prior to fabrication and/or purchase of any material and shall contact the owner’s Project Manager should existing conditions be different from the design drawings for this project. Conflicts arising due to lack of coordination shall be the responsibility and at the expense of the contractor.

H. Related Sections:
1. Drawings, Contract, including General and Supplementary Conditions, and Division 01 – General Requirements Specification Sections apply to this and all other Division 23 – Heating, Ventilating, and Air-Conditioning (HVAC) Specification Sections.

I. Deviations to the intended design or the scope of the work must be approved by the project engineer prior to commencing work. Failure to do so may result in the work to be removed at no cost to the owner.

J. All work shall be performed in accordance with all applicable local codes, standards, and amendments and/or other authorities that may have jurisdiction pertaining to the work. In addition, all work shall conform to the standards and practices of the owner.

K. Coordination:
1. The contractor shall be responsible for ensuring full coordination with other trades and contractors to accomplish the work as shown and noted in these contract documents. The contractor shall compare the drawings of other trades and report any discrepancies to the owner’s representative.
2. The contractor shall not fabricate or install items as shown on the drawings if there are discrepancies or conflicts between the existing conditions and the information shown on the drawings until such discrepancies have been resolved. Prior to fabrication or installation, the contractor shall immediately call such discrepancies or conflicts to the attention of the project coordinator.
3. Ductwork, piping, conduit, cabling, etc. shown on drawings shall be coordinated with air distribution devices, special ceiling, floor, and structure construction, etc. Provide additional rises and drops to those indicated on the drawings as required to coordinate with architectural, structural or mep elements shown on the contract documents. All utilities shall be routed in an orderly manner, grouped together wherever possible, and located so as to conserve building space. Ductwork, piping, conduit, cabling, etc. Shown on each plan is run above the ceiling on the floor where it is shown unless otherwise noted.
4. Coordinate locations of new and existing roof penetrations to minimize number of openings. Roof penetrations shall be made within roof curb. Electric and refrigerant lines to use same penetrations where possible.

L. All work noted "NIC" or "Not in Contract" is to be accomplished by another contractor and is not to be part of the construction agreement.
1.2 DEFINITIONS

A. Furnish: To purchase and deliver products to the project site and prepare for installation.

B. Install: To assemble, erect, secure, connect, and place furnished product into operation.

C. Provide: To furnish and install.

D. Products: Includes materials, systems, parts, and equipment.

E. Concealed: Embedded in or installed behind walls, within partitions, above suspended ceilings, in trenches, in tunnels and crawl spaces.

F. Exposed: Not installed underground or "concealed" as defined above.

G. Specifications: These specifications plus the Codes and Standards referenced herein.

1.3 CONTRACTOR QUALIFICATIONS

A. General: The firms that perform the installation of the work under this Division of specifications shall be one that maintains an established, experienced organization with a permanent, manned office within a radius of 100 miles of the project site, with the ability to provide a response time of 24 hours or less for maintenance of equipment.

B. Mechanical Firm's Proficiency: The firm shall have trained personnel, instruments, tools, and equipment to perform the installation and maintenance service specified. The firm shall have been in business performing services as specified herein for at least three years.

1.4 SAFETY:

A. Contractor shall comply with all applicable safety standards including, but not limited to OSHA standards and owner's requirements.

B. All safety exposures or violations shall be rectified immediately by the contractor. The contractor shall be responsible for providing protection of persons and property, providing safe working conditions throughout the work progress, providing temporary coverings for openings through walls or floors, and providing temporary barriers, partitions and/or dust barriers where required to maintain OSHA and the owner's safety standards and to prevent damage to property. All areas adjacent to the construction area or affected by the construction must be protected from damage, cleaned, and restored to the original condition at no additional expense to the owner. The contractor shall provide protective clothing and eyewear for all personnel who are required to handle hazardous chemical products or work in hazardous locations.
C. Submit material safety data sheets and manufacturer's current recommended method of installation for all materials used to perform the work indicated by these documents. All submittals shall be prepared according to current owner specifications and shall be approved prior to starting any work. All chemicals or chemical compounds proposed for use on the property including, but not limited to paint thinners, solvents, adhesives, sealants, cleaning compounds, epoxies, etc. Must be approved by the owner.

D. Dispose of debris, trash, and hazardous materials in accordance with all applicable codes.

E. The contractor shall be responsible for training his/her employees and subcontractors as required by the owner and in the recognition and avoidance of unsafe conditions, and in the regulations and hazards which apply to the area in which the work will take place.

F. Work areas shall be kept continuously, at all times, free of debris and non-hazardous material to the satisfaction of the project coordinator. All existing piping and conduits shall have temporary protection during construction. The contractor shall coordinate storage of materials, parking of vehicles, and restrictions of work with the project coordinator. After project completion, the site shall be cleaned up and restored to its condition or better prior to the start of the project to the satisfaction of the project coordinator.

1.5 QUALITY CONTROL

A. Comply with manufacturers' instructions, including each step in sequence.

B. Request clarification from Engineer before proceeding, should the manufacturers' instructions conflict with Contract Documents

C. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

D. Conform to reference standard by date of issue current on date of Contract Documents date for receiving bids, except where a specific date is established by code.

1.6 SUBMITTALS

A. Uniform General Conditions, including Supplementary General Conditions

B. DIVISION 1 – GENERAL REQUIREMENTS, Section 01000 – Special Conditions

C. Contractor shall provide product data submittals on all major equipment, components, and materials specified in these plans for engineers and owners review and acceptance prior to installation.
D. Completeness of submittal: All submittal data shall be submitted at one time unless unavailable drawings would delay job progress. In such a case long lead time items may be submitted individually ahead of the completed submittal binder and the binder, when submitted, shall have a properly labeled tab for insertion of individual submittals for the long lead time items.

E. Contractor Review: The Contractor shall check data carefully to insure compliance with these specifications prior to submitting. For product data describing two or more variants of the same model product, clearly mark the selected product and all included accessories and options. Stamp and sign each submittal section indicating review and approval and provide notes indicating any variances that exist.

F. Submittal data for Section 23 00 00 – General Mechanical Requirements:
   1. Electrical Requirements List: Provide typed on 8-1/2 x 11 inch plain bond paper a list indicating the electrical requirements for each piece of mechanical equipment. The list shall include all of the information shown on the sample list at the end of this Section. All of the information contained in the sheet shall be coordinated between the mechanical and electrical contractors so that the data reflects actual requirements for the submitted mechanical equipment. Submittals for electrically powered equipment shall not be reviewed until this sheet is received by the Engineer completed and signed. See sample Electrical Requirements List at the end of this Section.
   2. Coordination Drawings: Indicate the proposed locations of equipment, ductwork, piping, and materials by preparing floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations. The sheet metal drawing shall be the Base Sheet. Other drawings produced shall be coordination drawing overlays, so interferences can be detected. Prepare coordination drawings to a scale of 1/4" = 1'-0" or larger clearly indicating the following:
      a. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
      b. Clearances for installing and maintaining insulation.
      c. Clearances for installing and maintaining valves, dampers, and their actuators.
      d. Equipment connections and support details.
      e. Exterior wall and foundation penetrations.
      f. Fire-rated wall and floor penetrations.
      g. Sizes and location of required concrete pads and bases.
      h. Indicate locations where space is limited for installation and maintenance.
      i. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
      j. Indicate location of existing utilities, ducts, piping and equipment that are to remain.
      k. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.
G. Submittal data for other Division 23 Specification Sections: Provide data as required in each individual Division 23 Specification Sections. Submittal data types are as follow:
1. Compliance Data: Published literature, certificates, and lists indicating the product’s compliance with standards referenced in these specifications.
2. Published Literature: Indicate dimensions, weights, capacities, ratings, horsepower, gages, and finishes of materials, and electrical characteristics and connection requirements.
3. Performance Data: Performance data including fan curves, pump curves, and equipment output capacities complete with rating conditions as scheduled on contract drawings. As a minimum submitted data shall include all performance data scheduled or noted on contract drawings.
4. Sound Power Level Data: Equipment sound power level at 63, 125, 250, 500, 1000, 2000, 4000, and 8000 Hz octave band center frequencies plus db A weighted sound level. Data shall include distance from equipment to test equipment.
5. Electrical Requirements: Power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
6. Samples and Color Selection Charts.
7. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.
8. Manufacturer’s Instructions: Include installation instructions.
9. Certificates: Signed letters certifying compliance with specified requirements.
10. Calculations: Design and/or design calculations.

H. Shop drawings: all shop drawings, including product data submittals, shall be reviewed by the contractor prior to submitting to the engineer. All shop drawings not reviewed by the contractor will be returned without review. After review has been completed, submit a copy of each shop drawing to the owner with the approval seal of the engineer and the contractor. The use of reproductions of these contract drawings by any contractor, subcontractor, erector, fabricator or material supplier, in lieu of the preparation of shop drawings is forbidden. Shop drawings received bearing the engineer’s title and seal shall be promptly rejected.

1.7 SUBSTITUTIONS

A. Basis of Design: Model numbers indicated in other Division 23 Specification Sections or shown on the drawings are the Basis of Design. The Contractor may request substitution of equal and approved equipment from manufacturers listed in this specification or set forth in an addendum provided said equipment meets all requirements of the plans and specifications, has like electrical characteristics (e.g., same voltage, phase, fusing/circuit breaker requirements, single or multiple points of connection as indicated on the electrical drawings), and will fit in the available spaces in the building as shown.
B. If the Contractor chooses to provide equipment which meets all of the aforementioned requirements, but has different electrical characteristics, he shall bear all costs associated with that substitution including, but not limited to, breakers, fuses, disconnects, wiring, conduits, panels, starters, contactors, and the like. All electrical connections shall be coordinated with the Engineer and with the electrical subcontractor.

C. Substitutions: Refer to Special Conditions 1.09C, Article 8 of the Univ

D. A request for substitution constitutes a representation that the Contractor:
   1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
   2. Will provide the same warranty for the Substitution as for the specified Product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities.

E. The Engineer will notify Contractor in writing of decision to accept or reject request.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Deliver Products to the project in manufacturer’s original shipping packaging, properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Acceptance at Site: Comply with the following requirements:
   1. Inspect shipments and immediately report any damage to the carrier and to the Construction Manager so that job progress will not be delayed.
   2. All items received by the Contractor shall be left in their original containers, or as shipped with dust caps, packing materials, and weather proof covers until installed in final locations.

C. Storage and Protection: During construction maintain all delivered materials and equipment in an orderly manner and protect from damage by complying with the following minimum requirements:
   1. Products stored outside or in unheated spaces shall be covered with waterproof drop cloths or tarpaulins, and provided with blocking to raise the base of each item at least 6 inches above ground and water levels.
   2. Store electrical items that would be damaged by cold weather or condensation in a heated, enclosed space until placed into service.
   3. Products stored inside shall be protected from dirt, construction debris, welding and cutting spatters, paint dropping etc. either by original packaging or Contractor provided covers.
4. All installed materials and equipment shall be in a like new condition. Damaged equipment or materials shall be repaired to like new conditions or replaced at no cost to the Owner.

1.9 SEQUENCING AND SCHEDULING

A. Carefully examine the architectural, HVAC, controls, and electrical drawings and specifications. Coordinate all work with other disciplines to avoid conflicts and delay of installation schedule.

B. The Contractor shall install mechanical work so as not to interfere with the work of other disciplines or trades. If work is installed that does interfere, the work shall be corrected at no additional cost to the Owner. Occupation of a work space by any trade or discipline does not give the right of priority to the space.

C. Tests: Test requirements shall be as specified in other Division 23 Specification Sections. Provide the engineer 48 hours notification in advance of any test. Engineer, at his option, may witness test. Complete tests prior to insulating or otherwise covering work. Leaks shall be repaired, defective materials replaced, and system shall be retested. No water pressure test shall be conducted in freezing weather. Conduct test prior to connecting to equipment or isolate equipment from system.

1.10 UTILITY CONNECTIONS AND PERMITS

A. Water: Make arrangements with the water utility company to provide water service and meter as shown on site plan.

B. The contractor shall be responsible for securing and paying for all permits, licenses, clearances and certificates from the owner and local authorities having jurisdiction as required prior to the commencement of the work.

C. Prior to any cutting or trenching, verify with owners rep., utility companies, and landlord that all available information is known regarding underground obstructions. Take caution when trenching not to disturb any existing utilities. Notify owners representative immediately upon uncovering unknown utilities for further direction.

1.11 COMPLETION OF WORK

A. Execute final cleaning prior to final inspection.

B. Final Cleaning: Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

C. Clean construction debris from roof.

D. Remove waste and surplus materials, rubbish, and construction facilities from the site.
E. Contractor to provide start-up and commissioning services for all new systems and equipment, as well as training services for the owner’s maintenance personnel in the use of these systems and equipment. Adjust operating products and equipment to ensure smooth and correct operation.

F. Upon completion of construction, contractor shall demonstrate proper functionality of all fire smoke dampers and ahu smoke detectors to owner and/or engineer.

G. At the completion, an inspection shall be made and the entire system shall be shown to be in specified working condition. The following shall be available during the inspection:
   1. Texas Parks & Wildlife Department staff.
   2. Contractor representative.
   3. Mechanic with hand tools, ladder and flash light.
   5. Complete specifications and drawings with all addenda and revisions.

H. Refer to Article 12 of the Uniform General Conditions and Section 1.13 of Special Conditions for detailed project completion instructions.

1.12 GUARANTEE AND WARRANTIES

A. All Division 23 – Heating, Ventilating, and Air-Conditioning (HVAC) warranty periods begin as indicated in the Uniform General Conditions. The contractor shall make provisions so that manufacturer’s warranties begin on that date regardless of when equipment is delivered to the project site.

B. Warranties: Provide manufacturer’s equipment warranties when submitting Substantial Completion Inspection Request. Length of warranty period shall be as specified in individual Division 23 Specification Sections.

C. Guarantee: All equipment and materials furnished and all work performed under this Division of specifications shall be guaranteed to be free of defective materials and workmanship for a period of one year from the date specified in A above. Upon notice from the Owner of failure of any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be promptly replaced with new parts by the Contractor at no additional cost to the Owner. All labor required to perform guarantee shall be included as part of the complete guarantee warranty.

1.13 MAINTENANCE AND SERVICE

A. Maintenance: The Contractor shall maintain all systems installed under this Section of specifications for one year from date of Engineer’s final certificate.

B. Inspections: Provide four maintenance inspections at 90 day intervals. Check, repair, clean, adjust, and lubricate equipment. Replace filter media when exhausted or clean permanent filters.

C. Parts: Provide repair parts during maintenance periods.
1.14 MAINTENANCE DOCUMENTS AND INSTRUCTIONS

A. Maintenance Training: After placing systems in operation, provide 2 members of Owner's maintenance staff with 16 hours of operation and maintenance training for all systems included in this Section of specifications.

B. BAS Training: Provide Building Automation System (BAS) training as specified in Section 23 09 23 – Digital Control Equipment.

C. Maintenance Manuals: Two bound and indexed Operating and Maintenance Manuals shall be prepared by the Contractor and be submitted to the Engineer for approval when submitting Substantial Completion Inspection Request. Each manual shall contain the following information, data and drawings:
   1. List of contents. Insert under front cover.
   2. Copy of approved submittals, equipment, and materials.
   3. Installation, operating, and maintenance instructions for each item of equipment.
   4. Wiring schematics for each item of equipment.
   5. Manufacturer's list of renewal parts for each item of equipment with recommended stock items and quantities indicated.
   6. Manufacturer's equipment warranties.
   7. Copy of accepted Test and Balance Reports including list of instruments and description of methods employed.

D. Framed Instructions:
   1. Wall mount framed sequence of operations and control system schematic under glass in each mechanical room.
   2. Wall mount piping schematic showing equipment and valve locations in each mechanical room. Wall mount valve chart description next to each piping schematic.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Final Locations: Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected. Coordinate mechanical systems, equipment, and materials installation with other building components.

B. Prepare for Installation: Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
C. Deviation From Drawings: Drawings are schematic and show approximate location of equipment and materials, however, the Contractor shall obtain the Engineer's/Architect's approval before deviating from the drawings. Written dimensions shall take precedence over scaled dimensions.

3.2 MECHANICAL INSTALLATIONS

A. General: Installation shall be as specified in individual Division 23 Specification Sections and in accordance with approved manufacturer's installation instructions. Conflict between manufacturer's printed instructions and these specifications shall be brought to the attention of the Engineer/Architect.

B. Equipment: All equipment installed on this project shall be new and unused unless noted otherwise. The contractor shall remove all shipping labels, dirt, paint spots, grease, and stains from all equipment. Debris shall be removed as it accumulates. Upon completion of his work, the contractor shall clean all equipment. No loose parts or scraps of equipment shall be left on the premises.

C. Installation: Install systems, materials, and equipment to conform to approved submittal data, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.

1. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
2. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
3. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
4. Install systems, materials, and equipment level and plumb parallel and perpendicular to other building systems and components, following the building lines, where installed exposed in finished spaces.
5. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
6. Provide access panels or doors where units are concealed behind finished surfaces.
7. Install isolation valves at all piping branch taps (water, air, etc.).

D. Cleaning: Comply with the following cleaning requirements:

1. Upon completion of installation, piping, ducts, and equipment shall be thoroughly cleared of dirt, grease, rust and oil, primed where necessary, and left ready for painting. Vacuum clean the inside and outside of plenums and equipment cabinets.
2. Clean gages, thermometers, traps, strainers, fittings, and lavatory aerators.
E. Painting and Finishing: Comply with the following finishing requirements:
   1. Contractor shall clean, spot prime with zinc chromate and entirely repaint, with original color any factory finished equipment which has rusted or been damaged.
   2. Insulation coverings shall be cleaned, sized if necessary, and left ready for service identification.
   3. Ferrous metal shall be cleaned and primed, ready for painting.

F. Lubrication and Packing: Comply with the following requirements:
   1. Lubricate equipment with correct grade, type, and quantity of lubrication before placing equipment into service. Damages caused by not providing proper lubrication shall be repaired at Contractor's expense.
   2. Each shaft or valve stem containing a packing gland shall be checked for condition and examined for proper grade, amount, and type of packing by backing packing gland off.
   3. Maintain all lubrication and packing seals during construction, and assure that all are operating properly at the time of final acceptance. Replace worn gaskets and packing.
   4. When filling systems initially for hydrostatic pressure tests, adjust valve packing glands to finger tight, and allow packing to absorb water for five minutes prior to tightening packing nuts.
   5. All rotating pieces of equipment shall be properly lubricated prior to start-up. Damage to shafts, bearings, seals, etc., caused by lack of proper lubrication or over lubrication shall be repaired by the Contractor at no cost to the Owner.

3.3 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Division 01 – General Requirements. In addition to the requirements specified in Division 01 Specification Sections, the following requirements apply:
   1. In new construction areas, avoid cutting of concrete, masonry, and other finished work by use of sleeves and inserts.
   2. Any cutting thru structural members or floors shall first be coordinated with the structural engineer
   3. Cut holes through concrete, brick, tile, etc., when necessary, by rotary core drilling.
   4. During cutting and patching operations, protect adjacent installations.
   5. Perform at no expense to the Owner, cutting, fitting, and patching of mechanical equipment and materials required to:
      a. Uncover Work to provide for installation of ill-timed Work.
      b. Remove and replace defective Work.
      c. Remove and replace Work not conforming to requirements of the Contract Documents.
      d. Remove samples of installed Work as specified for testing.
      e. Install equipment and materials in existing structures.
      f. Upon written instructions from the Engineer, uncover and restore Work to provide for Architect's/Engineer's observation of concealed Work.
   6. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
7. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
8. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched. Repaired or patched surface finishes and components will match existing finishes. Use new materials.
9. All new wall and floor penetrations shall be made at 90 degree angles, unless shown otherwise, and shall be sealed fireproof and waterproof with an approved sealant. All penetrations through fire-rated construction shall be sealed with UL 1479 listed through-penetration firestop systems.
10. There shall be no drilling into the floor above or below, without first contacting the owner's designated representative.
11. All roof penetrations are to comply with owners roofing contractors and/or roofing insurance requirements.
12. Weight from piping penetrations through existing floors must be supported at the floor or from hangers above or below the floor. Insulation and vapor barrier shall be continuous throughout the floor. Floor penetrations shall be sealed water tight at the top of the floor.

3.4 SAMPLE SUBMITTAL FORMS

A. Sample Electrical Coordination Form

SAMPLE
CONTRACTOR COMPANY NAME
HVAC/ELECTRICAL DATA SHEET or PLUMBING/ELECTRICAL DATA SHEET
JOB TITLE
JOB LOCATION

<table>
<thead>
<tr>
<th>Nameplate Data (Mechanical/Plumbing Contractor to provide this portion)</th>
<th>Electrical Power Distribution (Electrical Contractor to provide this portion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Tag</td>
<td>Volts</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* MOCPD as listed per equipment manufacturer submittal data

** Must comply with equipment manufacturer submittal data
Mechanical Contractor Name & Signature: ____________________________________________

Electrical Contractor Name & Signature: __________________________________________

General Contractor Name & Signature: ____________________________________________

END OF SECTION
SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe hangers and supports.
   2. Hanger rods.
   3. Inserts.
   4. Flashing.
   5. Equipment curbs.

1.2 SUBMITTALS

A. Product Data:
   1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

   B. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.4 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
   1. Carpenter & Paterson Inc.
   2. Creative Systems Inc.
   3. Flex-Weld, Inc.
   4. Glope Pipe Hanger Products Inc.
   5. Michigan Hanger Co.
   7. Substitutions: Engineer approved equal.
2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Metal Flashing: 26 gage thick galvanized steel.

B. Metal Counterflashing: 22 gage thick galvanized steel.

C. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

D. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.5 SLEEVES

A. Sleeves for Round Ductwork: Galvanized steel.

B. Sleeves for Rectangular Ductwork: Galvanized steel or wood.

C. Sealant: Acrylic

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.

B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install damming materials to arrest liquid material leakage.

D. Obtain permission from Architect/Engineer before using powder-actuated anchors.
E. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.3 INSTALLATION - INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASME B31.5, ASME 31.9 and MSS SP 58.

B. Support horizontal piping as scheduled.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1-1/2 inch minimum vertical adjustment.

F. Support vertical piping at every floor.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide sheet lead packing between hanger or support and piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

L. Provide clearance in hangers and from structure and other equipment for installation of insulation.
3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of formed steel channel or steel pipe and fittings Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.6 INSTALLATION - FLASHING

A. Provide flexible flashing and metal Counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.

C. Provide curbs for roof installations 14 inches minimum high above roofing surface. Flash and counter-flash with sheet metal; seal watertight. Attach Counterflashing to equipment and lap base flashing on roof curbs. Flatten and solder joints.

D. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.7 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 2 inch above finished floor level. Caulk sleeves.

E. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

F. Install chrome plated steel escutcheons at finished surfaces.

3.8 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.
END OF SECTION
SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Tags.
   3. Labels.

1.2 SUBMITTALS

A. Product Data: Submit manufacturers catalog literature for each product required.

B. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Samples: Submit two tags, labels, and pipe markers; size used on project.

D. Manufacturer’s Installation Instructions: Indicate installation instructions, special procedures, and installation.

E. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.4 QUALITY ASSURANCE

A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years’ experience.

B. Installer: Company specializing in performing Work of this section with minimum three years’ experience.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.
PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Manufacturers:
   1. Craftmark Identification Systems
   2. Safety Sign Co.
   3. Seton Identification Products

B. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS

A. Plastic Tags:
   1. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches square.

B. Metal Tags:
   1. Brass or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges.

C. Information Tags:

D. Tag Chart: Typewritten letter size list of applied tags and location plastic laminated.

2.3 LABELS

A. Description: Polyester or Laminated Mylar, size 1.9 x 0.75 inches, adhesive backed with printed identification.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces for stencil painting.

3.2 INSTALLATION

A. Install identifying devices after completion of coverings and painting.

B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
C. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.

D. Install tags using corrosion resistant chain. Number tags consecutively by location.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Identify air handling units, pumps, and heat transfer equipment with plastic nameplates. Identify in-line pumps and other small devices with tags.

G. Identify control panels and major control components outside panels with plastic nameplates.

H. Identify valves in main and branch piping with tags.

I. Identify air terminal units and radiator valves with numbered tags.

J. Tag automatic controls, instruments, and relays. Key to control schematic.

K. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

L. For exposed natural gas lines other than steel pipe, attach yellow pipe labels with "GAS" in black lettering, at maximum 5 foot (5) spacing.

M. Identify ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

N. Provide ceiling stickers to locate mechanical equipment, valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION
SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Testing adjusting, and balancing of air systems.
   2. Measurement of final operating condition of HVAC systems.

1.2 SUBMITTALS

A. Prior to commencing Work, submit proof of latest calibration date of each instrument.

B. Test Reports: Indicate data on AABC MN-1 National Standards for Total System Balance forms, forms prepared following ASHRAE 111, or NEBB Report forms.

C. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

D. Prior to commencing Work, submit report forms or outlines indicating adjusting, balancing, and equipment data required. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty and Copy of NEBB Certificate of Conformance Certification

E. Submit draft copies of report for review prior to final acceptance of Project.

F. Furnish reports in digital format complete with table of contents page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of balancing valves and rough setting.

B. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with AABC MN-1 National Standards for Field Measurement and Instrumentation, Total System Balance, ASHRAE 111 or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

B. Prior to commencing Work, calibrate each instrument to be used.
1.5 QUALIFICATIONS

A. Agency: Company specializing in testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience certified by AABC or Certified by NEBB

B. Perform Work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

1.6 SEQUENCING

A. Sequence balancing between completion of systems tested and Date of Substantial Completion.

1.7 SCHEDULING

A. Schedule and provide assistance in final adjustment and test of life safety system with Fire Authority.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify systems are complete and operable before commencing work. Verify the following:
   1. Systems are started and operating in safe and normal condition.
   2. HVAC control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fans are rotating correctly.
   7. Access doors are closed and duct end caps are in place.
   8. Air outlets are installed and connected.
   9. Duct system leakage is minimized.

3.2 PREPARATION

A. Furnish instruments required for testing, adjusting, and balancing operations.

B. Make instruments available to Architect/Engineer to facilitate spot checks during testing.
3.3 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 10 percent of design.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.4 ADJUSTING

A. Verify recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.

D. Report defects and deficiencies noted during performance of services, preventing system balance.

E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner.

G. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities at site altitude.

B. Make air flow rate measurements in main ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain:
   1. Space temperatures within 2 degrees F.
   2. Minimal objectionable drafts.

E. Use volume control devices to regulate air quantities only to extent adjustments do not create objectionable air motion or sound levels. Effect volume control by using volume dampers located in ducts.
F. Vary total system air quantities by adjustment of fan speeds. Provide sheave drive changes to vary fan speed. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Make allowances for 50 percent loading of filters.

3.6 SCHEDULES

A. Partial list of Equipment Requiring Testing, Adjusting, and Balancing:
   1. Fans.
   2. Air Filters.
   3. Air Inlets and Outlets.

B. Report Forms
   1. Title Page:
      a. Name of Testing, Adjusting, and Balancing Agency
      b. Address of Testing, Adjusting, and Balancing Agency
      c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
      d. Project name
      e. Project location
      f. Project Architect
      g. Project Engineer
      h. Project Contractor
      i. Project altitude
      j. Report date
   2. Summary Comments:
      a. Design versus final performance
      b. Notable characteristics of system
      c. Description of systems operation sequence
      d. Nomenclature used throughout report
      e. Test conditions
   3. Electric Motors:
      a. Manufacturer
      b. Model/Frame
      c. HP/BHP and kW
      d. Phase, voltage, amperage; nameplate, actual, no load
      e. RPM
      f. Service factor
      g. Starter size, rating, heater elements
      h. Sheave Make/Size/Bore
   4. Air Moving Equipment:
      a. Location
      b. Manufacturer
      c. Model number
d. Serial number
e. Arrangement/Class/Discharge
f. Air flow, specified and actual
g. Return air flow, specified and actual
h. Outside air flow, specified and actual
i. Total static pressure (total external), specified and actual
j. Inlet pressure
k. Discharge pressure
l. Sheave Make/Size/Bore
m. Number of Belts/Make/Size
n. Fan RPM

5. Duct Traverse:
   a. System zone/branch
   b. Duct size
   c. Area
d. Design velocity
e. Design air flow
f. Test velocity
g. Test air flow
h. Duct static pressure
   i. Air temperature
   j. Air correction factor

6. Air Distribution Test Sheet:
   a. Air terminal number
   b. Room number/location
c. Terminal type
d. Terminal size
e. Area factor
f. Design velocity
g. Design air flow
h. Test (final) velocity
   i. Test (final) air flow
   j. Percent of design air flow

END OF SECTION
SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. HVAC equipment insulation, jackets and accessories.
   2. HVAC ductwork insulation, jackets, and accessories.

1.2 SUBMITTALS

A. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.

B. Manufacturer’s Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.

C. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

D. Duct insulation, Coverings, and Linings: Maximum 25/50 flame spread/smoke developed index, when tested in accordance with ASTM E84, using specimen procedures and mounting procedures of ASTM E 2231.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years’ experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer’s identification, including product density and thickness.
B. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.

B. Maintain temperature before, during, and after installation for minimum period of 24 hours.

PART 2 - PRODUCTS

2.1 MANUFACTURER

2.2 DUCTWORK INSULATION

A. Refer to Schedule on Drawings.

2.3 DUCTWORK INSULATION JACKETS

A. Refer to Schedule on Drawings.

2.4 DUCTWORK INSULATION ACCESSORIES

A. Vapor Retarder Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

B. Vapor Retarder Lap Adhesive: Compatible with insulation.

C. Adhesive: Waterproof, ASTM E162 fire-retardant type.

D. Liner Fasteners: Galvanized steel, welded with integral head.

E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

F. Lagging Adhesive: Fire retardant type with maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

G. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.

H. Adhesives: Compatible with insulation.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify equipment and ductwork has been tested before applying insulation materials.

B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - DUCTWORK SYSTEMS

A. Duct dimensions indicated on Drawings are finished inside dimensions.

B. Insulated ductwork conveying air below ambient temperature:
   1. Provide insulation with vapor retarder jackets.
   2. Finish with tape and vapor retarder jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. External Glass Fiber Duct Insulation:
   1. Secure insulation with vapor retarder with wires and seal jacket joints with vapor retarder adhesive or tape to match jacket.
   2. Secure insulation without vapor retarder with staples, tape, or wires.
   3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
   4. Seal vapor retarder penetrations by mechanical fasteners with vapor retarder adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

D. Duct and Plenum Liner:
   1. Adhere insulation with adhesive for 90 percent coverage.
   4. Seal liner surface penetrations with adhesive.
   5. Cut insulation for tight overlapped corner joints. Support top pieces of liner at edges with side pieces.

END OF SECTION
SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Duct Materials.
   2. Flexible ducts.
   3. Insulated flexible ducts.
   4. Ductwork fabrication.
   5. Duct cleaning.

1.2 PERFORMANCE REQUIREMENTS

A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.3 SUBMITTALS

A. Product Data: Submit data for duct materials and duct liner.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.

B. Construct ductwork to NFPA 90A, NFPA 90B and NFPA 96 standards.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures during and after installation of duct sealant.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.
PART 2 - PRODUCTS

2.1 DUCT MATERIALS

A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G60, zinc coating in conformance with ASTM A90/A90M.

B. Steel Ducts: ASTM A568/A568M.

C. Fasteners: Rivets, bolts, or sheet metal screws.

D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 INSULATED FLEXIBLE DUCTS

A. Manufacturers:
   1. Thermaflex
   2. Ameriflex
   3. Flexmaster USA
   4. Substitutions: With Engineer approval.

B. Product Description: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helical wound spring steel wire; fiberglass insulation; aluminized vapor barrier film.
   1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
   3. Temperature Range: -20 degrees F to 250 degrees F.

2.3 DUCTWORK FABRICATION

A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated on Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible (Round Duct Construction Standards), and as indicated on Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide airfoil turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
E. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

F. For rectangular duct, use 45 deg tap per SMACNA requirements.

G. For round duct, provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.

H. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems, or tape.
   1. Sealants, Mastics and Tapes: Conform to UL 181A. Provide products bearing appropriate UL 181A markings.
   2. Do not provide sealing products not bearing UL approval markings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

B. Install glass fiber ducts in accordance with SMACNA Fibrous Glass Duct Construction Standards. Obtain manufacturer's inspection and acceptance of fabrication and installation at beginning of installation.

C. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

D. Use double nuts and lock washers on threaded rod supports.

E. Connect flexible ducts to metal ducts with draw bands.

F. Set plenum doors 6 to 12 inches above floor. Arrange door swing so fan static pressure holds door in closed position.

G. Exhaust Outlet Locations:
   1. Minimum Distance from Property Lines: 3 feet.
   2. Minimum Distance from Building Openings: 3 feet.
   3. Minimum Distance from Outside Air Intakes: 10 feet.
3.3 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air flow, clean one half of system completely before proceeding to other half. Protect equipment with potential to be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION
SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Diffusers.
   2. Registers

1.2 SUBMITTALS

A. Product Data: Submit sizes, finish, and type of mounting. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

B. Test Reports: Rating of air outlet and inlet performance.

C. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of air outlets and inlets.

1.4 QUALITY ASSURANCE

A. Test and rate diffuser, register, and grille performance in accordance with ASHRAE 70.

B. Test and rate louver performance in accordance with AMCA 500.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years’ experience.

1.6 EXTRA MATERIALS

A. Furnish 10 percent extra air outlets and inlets.

PART 2 - PRODUCTS

2.1 AIR DISTRIBUTION DEVICES

A. Manufacturers:
   1. E. H Price Company
   2. Krueger
   3. Titus
4. Substitutions: Engineer approved equal.

B. Refer to Schedule on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify inlet and outlet locations.

B. Verify ceiling systems are ready for installation.

3.2 INSTALLATION

A. Install diffusers to ductwork with airtight connection.

B. Install balancing dampers on duct take-off to diffusers, grilles, and registers, whether or not dampers are furnished as part of diffuser, grille, and register assembly.

C. Paint visible portions of ductwork and/or infrastructure behind air outlets and inlets matte black.

D. Do not locate air registers, diffusers or grilles in floors of toilet or bathing rooms.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

END OF SECTION
SECTION 23 81 26 - SPLIT-SYSTEM AIR-CONDITIONERS

1.1 SUMMARY

A. Section Includes:
   1. Air handling unit.
   2. Condensing unit.

1.2 DEFINITIONS

A. Energy Efficiency Ratio (EER) - Ratio of net cooling capacity in Btu/h to total rate of electric input in watts under designated operating conditions.

B. Integrated Part-Load Value (IPLV): Single-number figure of merit based on part-load EER, COP, or kW/ton expressing part-load efficiency for air-conditioning and heat pump equipment on basis of weighted operation at various load capacities for the equipment.

C. Integrated Energy Efficiency Ratio (IEER) – A measure that expresses cooling part-load EER efficiency for commercial unitary air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities. As of January 1, 2010 IEER replaced IPLV for all commercial unitary products rated above 65,000 Btu/h.

1.3 SUBMITTALS

A. Product Data: Submit data indicating:
   1. Cooling and heating capacities.
   2. Efficiencies.
   3. Dimensions.
   4. Weights.
   5. Rough-in connections and connection requirements.
   6. Duct connections.
   7. Electrical requirements with electrical characteristics and connection requirements.
   8. Controls.

B. Manufacturer’s Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.

C. Manufacturer’s Certificate: Certify Products meet or exceed specified requirements.

D. Manufacturer’s Field Reports: Submit start-up report for each unit.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of controls installed remotely from units.
B. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data.

1.5 QUALITY ASSURANCE

A. Performance Requirements: Conform to minimum EER, IPLV, or IEER prescribed by ASHRAE 90.1 when tested in accordance with ARI 340/360 or ARI 365.

B. Cooling Capacity: Rate in accordance with ARI 340/360 or ARI 365. Testing standard varies with equipment type.

C. Sound Rating: Measure in accordance with ARI 270.

D. Insulation and adhesives: Meet requirements of NFPA 90A.

E. Perform Work in accordance with applicable local, state, and federal standards.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept units and components on site in factory protective containers, with factory shipping skids and lifting lugs. Inspect for damage.

B. Comply with manufacturer's installation instruction for rigging, unloading and transporting units.

C. Protect units from weather and construction traffic by storing in dry, roofed location.

1.8 COORDINATION

A. Coordinate installation of condensing units with concrete pad.

B. Coordinate installation of air handling units with building structure.

1.9 WARRANTY

A. Furnish five-year manufacturer's warranty for compressors.

1.10 MAINTENANCE SERVICE

A. Furnish service and maintenance of equipment for one year from Date of Substantial Completion. Include maintenance items as shown in manufacturer's operating and
maintenance data, including filter replacements, fan belt replacement, and controls checkout and adjustments.

1.11 MAINTENANCE MATERIALS

A. Furnish one set for each unit of fan belts and filters.

PART 2 - PRODUCTS

2.1 SPLIT SYSTEM AIR CONDITIONING UNITS

A. Manufacturers:
   1. Carrier Corp.
   2. Lennox International
   3. McQuay International
   4. The Trane Company
   5. York International
   6. Substitution: With engineer approval

B. Product Description: Split system consisting of air handling unit and condensing unit including cabinet, evaporator fan, refrigerant cooling coil, compressor, refrigeration circuit, condenser, air filters, controls, air handling unit accessories, condensing unit accessories, and refrigeration specialties.

2.2 AIR HANDLING UNIT

A. Configuration: As indicated on Drawings.

B. Cabinet:
   2. Insulation: Factory applied to each surface to insulate entire cabinet. One inch thick aluminum foil faced glass fiber with edges protected from erosion.

C. Evaporator Fan: Forward curved centrifugal type, resiliently mounted with adjustable belt drive and high efficiency motor complying with NEMA MG1, Type 1. Motor permanently lubricated with built-in thermal overload protection.

D. Evaporator Coil: Constructed of copper tubes expanded onto aluminum fins. Factory leak tested under water. Removable, PVC construction, double-sloped drain pan with piping connections on both sides. Provide float switch to disable fan and secondary drain pan.

E. Refrigeration System: Single refrigeration circuits controlled by factory installed thermal expansion valve.
F. Electric Heating Coil: Helical nickel-chrome resistance wire coil heating elements with refractory ceramic support bushings easily accessible with automatic reset thermal cut-out, built-in contactors, galvanized steel frame, control circuit transformer and fuse, manual reset thermal cut-out, air flow proving device, pilot duty toggle switch, load fuses. Number of stages as indicated on Drawings.

G. Air Filters: 2 inch thick pleated glass fiber disposable media in metal frames. Minimum MERV of 6 prescribed by ASHRAE 62.1 when rated in accordance with ASHRAE 52.2.

H. Air Handling Unit Accessories:
   1. Discharge Plenum: with construction and finish matching unit casing. Integral grille of aluminum construction and adjustable louvers.
   2. Return Air Grille: mounted in return air opening of aluminum construction and fixed louvers.
   3. Mounting Sub-base with construction and finish matching unit casing.

2.3 CONDENSING UNIT

A. General: Factory assembled and tested air cooled condensing units, consisting of casing, compressors, condensers, coils, condenser fans and motors, and unit controls.

B. Unit Casings: Exposed casing surfaces constructed of galvanized steel with manufacturer's standard baked enamel finish. Designed for outdoor installation and complete with weather protection for components and controls, and complete with removable panels for required access to compressors, controls, condenser fans, motors, and drives.

C. Compressor: Single refrigeration circuit with rotary or semi-hermetic reciprocating type compressors, resiliently mounted, with positive lubrication, and internal motor overload protection.

D. Condenser Coil: Constructed of copper tubing mechanically bonded to aluminum fins, factory leak and pressure tested.

E. Controls: Furnish operating and safety controls including high and low pressure cutouts. Control transformer. Furnish magnetic contactors for compressor and condenser fan motors.


G. Condensing Unit Accessories: Furnish the following accessories:
   1. Controls to provide low ambient cooling to 0 degrees F.
   2. Time delay relay.
   3. Anti-short cycle timer.

H. Refrigeration specialties: Furnish the following for each circuit:
   1. Charge of compressor oil.
   2. Holding charge of refrigerant.
   3. Replaceable core type filter drier.
   4. Liquid line sight glass and moisture indicator.
   5. Shut-off valves on suction and liquid piping.
   6. Liquid line solenoid valve.
   7. Charging valve.
   8. Oil level sight glass.
   9. Crankcase heater.
  10. Pressure relief device.

I. Refrigerant: Furnish charge of refrigerant.

2.4 CONTROLS

A. Thermostat: 7 day programmable electronic space thermostat with single-stage heating and single-stage cooling, with automatic changeover and heating setback and cooling setup capability. Furnish system selector switch off-heat-auto-cool and fan control switch, auto-on.

2.5 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Electrical Characteristics: As indicated in Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify concrete pad for condensing unit is ready for unit installation.

3.2 INSTALLATION - AIR HANDLING UNIT

A. Connect air handling units to supply and return ductwork with flexible connections.

B. Install condensate piping with trap and route from drain pan to location indicated on Drawings.

C. Install components furnished loose for field mounting.

D. Install connection to electrical power wiring.

3.3 INSTALLATION - CONDENSING UNIT

A. Install condensing units on vibration isolators.
B. Install units on concrete foundations provided by mechanical contractor.

C. Install refrigerant piping from unit to condensing unit per manufacturer recommendations and requirements. Install refrigerant specialties furnished with unit.

D. Evacuate refrigerant piping and install initial charge of refrigerant.

E. Install electrical devices furnished loose for field mounting.

F. Install control wiring in conduit between air handling unit, condensing unit, and field installed accessories.

G. Install connection to electrical power wiring.

3.4 CLEANING

A. Vacuum clean coils and inside of unit cabinet.

B. Install temporary filters during construction period. Replace with permanent filters at Substantial Completion.

3.5 DEMONSTRATION

A. Demonstrate air handling unit operation and maintenance.

B. Demonstrate starting, maintenance, and operation of condensing unit.

3.6 PROTECTION OF FINISHED WORK

A. Do not operate air handling units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION
SECTION 26 00 00 - ELECTRICAL GENERAL CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electrical materials and methods.

B. The scope of work shall include complete provisions for electrical power distribution to all lighting, devices, appliances, and equipment shown on the construction documents.
   1. Provisions include, but are not limited to, all supplies, materials, equipment, tools, and labor.
   2. Provisions also include all miscellaneous materials required to complete the work shown including, but not limited to, supports, hangers, raceways, boxes, sleeves, seals, equipment pads, wiring connectors, terminals, labels, signs, and markers.
   3. The construction documents include all plans, elevations, details, diagrams, schedules, and notes on the drawings and the written specifications including any items mentioned in either the specifications or on the drawings but not in the other.
   4. Where used on the plans and in the specifications and where not specifically noted otherwise, the term "provide" and the term "install" shall mean furnish, install, connect, and test.
   5. Unless explicitly noted "by others" or "existing", all items shown graphically or specified by notes and details on the plans shall be furnished, installed, connected, and tested as needed.

C. In addition to the general scope described above, the work shall include:
   1. Application for temporary and permanent electrical service, Permitting, Inspection, and payment of all associated fees.
   3. Equipment rental.
   4. Temporary construction power and lighting. GFCI receptacles shall be used for all construction power.

D. The intent of the drawings and specifications is to set forth the general requirements and equipment necessary for the functioning of the electrical system. The drawings and specifications do not provide a complete list of materials and work required. All miscellaneous electrical components required by good practice and workmanship for the complete installation of the electrical system shall be provided by the contractor.

E. Related Sections:
   1. This and all other division 26 specifications, the construction drawings, general contract provisions, and division 1 specifications shall be considered collectively as the total general requirements for the electrical equipment and electrical system installation and all special systems shown or described on the electrical or "E series" sheets.
1.2 REFERENCES

A. Materials, equipment, and the work performed shall comply with current requirements, rules and regulations of and, where applicable, be certified by the following standards, codes and organizations:

1. American National Standards Institute (ANSI)
3. Americans with Disabilities Act (ADA)
4. ASHRAE/IES 90.1
5. Institute of Electrical and Electronics Engineers (IEEE)
9. National Electrical Manufacturer's Code (NEMA)
11. National Fire Protection Associations (NFPA)
13. Underwriter's Association (UL)
14. Where discrepancies are found between the requirements of these standards codes, ordinances, regulations and the drawings and specifications, the contractor should notify the engineer prior to installation. Installed work that fails to comply with the requirements of the above shall be replaced at contractor's expense.

B. Uniform General Conditions, including Supplementary General Conditions.

C. Division 1 – General Requirements, Section 01000 – Special Conditions.

1.3 DEFINITIONS

A. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.

B. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

C. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 SUBMITTALS

A. Submittal requirements shown here shall be used in conjunction with the requirements of the other specification sections. Where in conflict, the more stringent requirements shall apply.

B. For each product required to be submitted, provide the following
1. Product Data: Submit catalog data showing manufacturer’s name and contact information, all standard features, dimensions, weights, listings and product labels, material types, finishes and clearly indicating which optional features will be provided.
   a. Include amperage and voltage ratings, over-current protective device ratings, AIC ratings, etc
   b. Where multiple sizes are listed, indicate sizes to be used.
   c. Where multiple products are shown on the same page, indicate which products to be used.

2. Shop Drawings (where applicable): Manufacturer or contractor prepared drawings showing all relevant dimensions, weights, electrical and mechanical connection requirements, conduit entry points, assembly requirements, lifting requirements, lifting points, and required clearances.
   a. Include dimensioned plan views and elevations.
   b. Include all relevant electrical diagrams including schematic and interconnection diagrams for power, signal, and control wiring.

C. Submittals shall be organized by specification section, provided with a table of contents, and a cover page with all pertinent project information including contractor’s name and contact information, project name and number, and specification sections submitted.

D. Rejected submittals shall be resubmitted within 15 calendar days of notification of rejection.

E. Any equipment covered by division 26 specifications that is installed by the contractor without submittal approval and is not in compliance with the appropriate specifications shall be replaced at the contractor’s expense.

F. As-Constructed Record Drawings: The Contractor shall maintain a master set of As-Constructed Record Drawings that show changes and any other deviations from the drawings. The markups must be made as the changes are done. At the conclusion of the job, these As-Built Record Drawings shall be transferred to AutoCad electronic files by the engineer and shall be complete and delivered to the Owner’s Representative prior to final acceptance.

1.5 CLOSEOUT SUBMITTALS

A. Refer to UGC 12.1.

B. DIVISION 1 – GENERAL REQUIREMENTS – Section 01000 – Special Conditions 1.13.

C. In accordance with the UGC and SC, provide a closeout submittal in a three ring binder in addition to a combined PDF containing the following information in addition to items specified in other sections.
   1. As constructed drawings showing the actual locations of installed equipment, site raceways and boxes.
   2. Operation and Maintenance data
   3. Shop Drawings
4. Test results
5. Actual circuit arrangements at panels and equipment. Provide complete, typed as built of all panel schedules.

D. Operation and Maintenance Data: At the end of construction, provide the owner with an 8.5x11 bound manual in a three ring binder in addition to a combined PDF including the following information:
1. Provide product data as defined under submittals.
2. Provide manufacturer’s installation and maintenance instructions for normal operation, routine maintenance and testing, and emergency maintenance procedures.
3. Spare parts listing; source of replacement parts and supplies; and recommended maintenance procedures and intervals.

E. Shop Drawings: At end of construction, provide owner with a final draft, new copy of all shop drawings that were field modified after the original submittal was approved

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products shown on the construction documents with minimum five years documented experience.
   1. Manufacturer shall maintain or certify an independently operated service center capable of providing training, support, parts, and maintenance services.

B. Supplier: Authorized distributor

C. Installer: A state licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work. Where noted in the specifications, required by code, or required by the manufacturer, installer shall be a manufacturer trained and/or certified installer of the specific product to be installed.

1.7 QUALITY ASSURANCE

A. Inclusion of specific products in these specifications and on the plans does not mean that said products may be used for all applications in all environments. Products may only be used where approved either in the specification installation requirements sections or on the plans. Where the construction documents do not explicitly state what products are acceptable for an application, the most robust products specified are assumed to be the minimum requirement.

B. Regulatory Requirements
   1. The contractor shall comply with the requirements of all laws, rules, regulations, code and ordinances that have been adopted by the federal, state, and local authorities having jurisdiction (AHJ). All equipment, materials, means and methods shall be acceptable to the AHJ’s.
   2. Electrical installations shall conform to IEEE C2, NFPA 70, local codes and specified requirements herein. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
3. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears.

C. Standard Products
1. Unless otherwise approved, all equipment shall be new, properly designed, from a reputable manufacturer meeting the specification qualifications, in compliance with the specification requirements, and in full working order.

2. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

3. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

4. Products shall have been in satisfactory commercial or industrial use prior to bid opening. The minimum time of use shall be 2 years. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. Longer periods may be specified for specific products. The product shall have been on sale on the commercial market through advertise, manufacturers' catalogs, or brochures during the 2-year period.

D. Material and Equipment Manufacturing Date
1. Products manufactured more than 2 years prior to date of delivery to site shall not be used, unless specified otherwise.

E. All equipment used for testing shall be in full working order and calibrated per the manufacturer's recommendations.

1.8 WARRANTY

A. The equipment items shall be supported by service organizations which are within 100 miles to the project site in order to render service to the equipment on a regular and emergency basis during the warranty period of the contract. The contractor shall respond to requests for non-critical maintenance and repairs within the 24 hours. Contractor shall respond to the site within eight hours for emergency equipment breakdown. The severity of the need will be communicated when the Owner calls for assistance.

1.9 COORDINATION

A. All power outages shall be coordinated in writing with the owner a minimum of one (1) week prior to the outage.
B. If the owner will occupy any portion of the facility during any period of construction, cooperate fully with the owner or his representative during construction operations to minimize conflicts and to facilitate owner usage so as not to interfere with the owner’s operations.

C. The drawings are diagrammatic. They do not show switches, power and data outlets, special systems components (FA, Access Control, AV, etc), electrical equipment, equipment connections, required raceways, etc. in their exact dimensioned locations. The contractor must carefully review the field conditions and plans to identify conflicts and areas that require coordination.

D. Coordinate electrical and special systems equipment rough in with millwork, signs, mechanical and plumbing systems, sprinkler systems, architectural and structural elements, and the owner’s representative. Minor changes in electrical equipment locations and layout that are required by site conditions or order by the design team prior to performance of work shall be made by the contractor without additional charges to the owner.

E. Maintain required NEC working space and dedicated equipment spaces around all electrical equipment, control panels, etc that are subject to maintenance, testing, or user interface. Coordinate with other trades prior to installation. If clearance cannot be provided, the contractor shall notify the engineer prior to rough-in.

F. Coordinate color selections for luminaires and all device plates with owner.

G. Contractor shall be responsible for field coordinating with other trades.

H. Coordinate arrangement, mounting, and support of electrical equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope.
   4. To allow for the appropriate installation of furniture and equipment relative to receptacles and switches.

I. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

J. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

K. Obtain and review shop drawings, product data, manufacturer’s wiring diagrams, and manufacturer’s instructions for equipment furnished under other sections.

L. Determine connection locations and requirements.

M. Sequence rough-in of electrical connections to coordinate with installation of equipment.
N. Sequence electrical connections to coordinate with start-up of equipment.

1.10 DELIVERY STORAGE AND HANDLING

A. Store in clean, dry space located above grade and protect from dirt, water, construction debris, traffic, freeze, and where applicable, deterioration from sun light.

B. Maintain factory wrapping or provide additional canvas or plastic cover for all large electrical equipment. Follow all manufacturer recommendations for humidity and max/min temperatures for storing electrical equipment.

1.11 SAFETY

A. The Contractor shall follow all industry standard safety procedures.
   1. The Contractors shall be responsible for training all personnel under their employ in areas concerning safe work habits and construction safety. The Contractor shall continually inform personnel of hazards particular to this project and update the information as the project progresses.
   2. The Contractor shall secure all electrical rooms, to limit access, prior to energizing any high voltage switchgear and shall control access during the project after energization. The Contractor shall post and maintain warning and caution signage in areas where work is ongoing near energized equipment. The Contractor shall cover all energized live parts when work is not being done in the equipment. This includes lunch and breaks.
   3. The Contractor shall strictly enforce OSHA lock out/tag out procedures. Initial infractions shall result in a warning; a second infraction shall result in the removal of the workman and his foreman from the site. Continued infractions shall result in removal of the Contractor from the site.

1.12 SHORING AND EQUIPMENT SUPPORTS

A. Provide all permanent and temporary bracing, anchoring, supports, and shoring required to firmly stabilize and secure all raceways, boxes, enclosure, equipment, and devices.

B. Provide free standing racks to supports equipment. Racks shall be securely bolted to the floor, wall, and or ceilings. Where secured to only one surface, provide angle bracing so that racks have a minimum of 4 attachment points.

C. Provide concrete housekeeping pads for floor mounted electrical equipment. Coordinate with flooring contractor for installation.
   1. 3000PSI, with rebar reinforcement.
   2. Provide dowels for connection to new or existing adjacent slabs
   3. Pad shall be 4" thick and protrude a minimum of 1" beyond the edge of equipment.
   4. Chamfer top edges of slab

1.13 TEMPORARY CONSTRUCTION POWER AND LIGHTING

A. Provide temporary power service per utility company specifications
1. Contractor shall be responsible for securing permits and coordinating temporary service with utility provider.

2. Provide temporary power service pole per utility company specifications.

3. Provide service feeder from temporary service point to construction trailers and power distribution assemblies to serve power tools and construction equipment.

B. Provide panel or assembly containing GFCI receptacles for power tools to be used on site.

C. Provide temporary power cables neatly trained and protected from damage.

D. Provide temporary lighting throughout area of construction. Install at ceiling level out of way of construction work.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Equipment to be installed outdoors, in corrosive or hazardous environments shall be rated for the intended use.

B. Compliance with the requirements of the contract documents shall not relieve the contractor of the responsibility of providing equipment that is new, properly designed, from a reputable manufacturer, and in full working order.

C. If conflicts occur between the specifications and drawings, the higher quality, price or quantity shall be provided and installed.

D. If there is any question as to quality, size or quantity necessary, the contractor shall provide a written request for clarification from the Engineer. Contractor shall be responsible for any additional expenses incurred as a result of the contractor’s failure to obtain clarification during the solicitation period or after award.

E. Detailed product specifications are included in other specification section and on the plans.

2.2 FINISHES

A. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

B. Raceways, boxes, supports, etc shall be galvanized: gold, silver, or hot dipped, unless noted otherwise.
   1. Do not use pre-galvanized products that are formed, cut, or punched after galvanization.
   2. Do not use hot dip galvanized threaded products.
2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 FIELD APPLIED PAINTING

A. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.2 FIELD PROGRAMMING

A. Electrical contractor shall be responsible for the coordination and payment of programming for all programmable devices and equipment including, but not limited to, lighting controls, circuit breakers, etc.

B. Where required, the manufacturer of the product shall be engaged to perform the programming.

3.3 EXAMINATION

A. If a conflict is found between the specification and plans, notify the Architect or Engineer of the conflict.

B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

C. Verify existing conditions are as shown on the plans and that adequate space is available for the equipment for installation.

3.4 EXISTING WORK

A. Maintain in service existing systems that are required for life safety or ongoing operations during construction.

B. Remove exposed abandoned equipment wiring connections, conduit, and boxes, including abandoned connections, conduit, and boxes above accessible ceiling finishes.

C. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.

D. Extend existing equipment connections using materials and methods compatible with existing electrical installations, or as specified.
E. Contractor to remove all abandoned wire near the surface and leave all wiring buried in place.

END OF DOCUMENT
SECTION 26 05 19 - CONDUCTORS AND CABLES 600V OR LESS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

1.2 REFERENCES

A. International Electrical Testing Association:

B. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.
   2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

C. Uniform General Conditions, including Supplementary General Conditions.

D. Division 1 – General Requirements, Section 01000 – Special Conditions.

1.3 SUBMITTALS

A. Product Data: Submit catalog data showing all standard features, dimensions, weights, listings and product labels, material types, finishes and clearly indicating which optional features will be provided.
   1. Include amperage and voltage ratings.
   2. Where multiple sizes are listed, indicate sizes to be used.
   3. Where multiple products are shown on the same page, indicate which products to be used.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and circuits.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: A licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work. Where noted in the specifications or
required by the manufacturer, installer shall be a manufacturer trained and/or certified installer of the specific product to be installed.

1.6 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.

B. Perform Work in accordance with all applicable city, state, and federal requirements.

C. Maintain one copy of each document on site.

D. Source Limitations: All components required for a complete functioning system as described here in shall be obtained through one source from a single manufacturer.

E. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

1.7 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.8 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

B. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
   1. Solid, insulated conductor in raceway for feeders and branch circuits 10 AWG and smaller.
   2. Stranded, insulated conductors in raceway for feeders and branch circuits 8 AWG and larger
   3. Stranded, insulated conductors for control circuits. Route in raceway, except were otherwise allowed to be run exposed in plenum, in tray, etc.
   4. Conductor not smaller than 12 AWG for power and lighting circuits.
   5. Conductor not smaller than 14 AWG for control circuits.
   6. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.
B. Wiring Methods: Provide the following wiring methods:
   1. For public buildings
      a. Concealed and Exposed Dry, Wet, or Damp Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
      b. Exterior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
      c. Underground Locations: Use only building wire, Type XHHW insulation, in raceway.

2.2 BUILDING WIRE

A. Manufacturers:
   1. AETNA
   2. American Insulated Wire Corp.
   3. Colonial Wire Model
   4. Encore Wire Model
   5. General Cable Co. Model
   6. Republic Wire Model
   7. Rome Cable Model
   8. Service Wire Co. Model
   9. Southwire Model
   10. Superior Essex Model
   11. Substitutions: With engineer approval.

B. Product Description: Single conductor insulated wire.
   2. Insulation Voltage Rating: 600 volts.
   3. Insulation Temperature Rating: 90 degrees C.

C. Grounding conductors, where insulated, shall be colored solid green or identified with green color as required by the NEC. Conductors intended as a neutral shall be colored solid white, or identified as required by the NEC. All motor or equipment power wiring shall be colored according to Section 26 05 53, Electrical Identification.

2.3 NONMETALLIC-SHEATHED CABLE

A. Only allowed in TPWD 126467 – Chaparral WMA New Residences

B. Manufacturers:
   1. Diamond Wire & Cable Co.
   2. Essex Group Inc.
   3. General Cable Co.
   4. Substitutions: With engineer approval.

C. Conductor: Copper.

D. Insulation Voltage Rating: 600 volts.
2.4 METAL CLAD CABLE

A. Manufacturers:
   1. Diamond Wire & Cable Co.
   2. Essex Group Inc.
   3. General Cable Co.
   4. Substitutions: With engineer approval.

B. Product Description:
   2. Insulation Voltage Rating: 600 volts.
   3. Insulation Temperature Rating: 90 degrees C.

C. Armor Material: Steel.

D. Armor Design: Interlocked metal tape

E. Jacket: Where required.

F. Only allowed from junction box to end device. MC cable is not allowed to exit panelboards.

2.5 WIRING CONNECTORS

A. Provide factory-fabricated, metal connectors of the size, rating, material, type and class as required by manufacturer of the equipment and the NEC. The following types, classes, kinds and styles should be used only where appropriate and as noted
   1. Solderless Pressure Connectors
   2. Crimp
   3. Threaded
   4. Insulated Spring Wire Connectors with plastic caps for 10 AWG and smaller
   5. Split bolt parallel connectors
   6. Pre-insulated multi-tap connectors
   7. Epoxy resin type splicing kits.

B. Wiring connectors shall be insulated to 600V. Conducting components shall match conducting material of wiring (copper, unless noted otherwise).

2.6 TERMINATIONS

A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars. Confirm where compression lugs will be required and where mechanical lugs will be acceptable on this project. Please note that the switchgear manufacturers limit where compression lugs are available for their electrical equipment.
C. Control wiring: Use insulated terminals for control wiring. Use flange spade compression terminal for termination of stranded conductors at wiring devices, including grounding connections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify interior of building has been protected from weather.
B. Verify mechanical work likely to damage wire and cable has been completed.
C. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.
B. Clean conductor surfaces before installing lugs and connectors.

3.3 EXISTING WORK

A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.
B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.
C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.
E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.4 INSTALLATION

A. Neatly train and lace wiring inside boxes, equipment, and panelboards.
B. Install electrical cable, wire and connectors as indicated, in accordance with the manufacturer’s written instructions, the applicable requirements of NEC and the National Electrical Contractors Association’s “Standard of Installation”, and as required to ensure that products serve the intended functions.
C. Wiring Installation in Raceways
1. Wire and cable shall be pulled into clean dry conduit. Do not exceed manufacturer’s recommended values for maximum pulling tension.
2. Do not install the conductors until the raceway system is complete and properly cleaned.
3. Pull conductors together where more than one is being installed in a raceway.
4. Use UL listed pulling compound or lubricant, when necessary; compound must not deteriorate conductor and insulation.
5. Do not use a pulling means, including fish tape, cable or rope, which can damage the raceway.
6. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
7. Place an equal number of conductors for each phase of a circuit in same raceway.
8. Provide separate conduit or raceway for line and load conductors of motor starters, safety disconnect switches, and similar devices. Those devices shall not share the same raceway.
9. All conduits shall contain a green grounding conductor. Conduit, wireways, or boxes shall not be used as the equipment grounding conductor.

D. Cable:
1. Protect exposed cable from damage.
2. Support cables above accessible ceiling, using spring metal clips or appropriate cable ties to support cables from structure. Do not rest cable on ceiling panels.
3. Use suitable cable fittings and connectors.

E. Metal Clad and Metal Armored Cable
1. Metal clad cable shall not be used for homeruns or in exposed locations. Use shall be restricted to locations and conditions explicitly allowed by these specifications and the owner’s design guidelines.
2. MC cable may be used after the first device on a 20A, 120V circuit where concealed.

F. Wiring Connections and Terminations
1. Install splices, taps and terminations, which have equivalent-or-better mechanical strength and insulation as the conductor. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
2. Keep conductor splices and taps accessible and to a minimum. Splice branch circuits only in accessible junction or outlet boxes. Where terminations of cables that are installed under this Section are to be made by others, provide pigtail of adequate length for neat, trained and bundles connections, minimum 5 feet at each location, unless noted otherwise on drawings.
3. Splices below grade shall only be in handholes or manholes and shall be made watertight with epoxy resin type splicing kits similar to Scotchcast. 20A branch circuit splices installed below grade may use scotch-lock or other means of making water resistant.
4. Use splice, tap and termination connectors, which are compatible with the conductor material.
5. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

6. Tape un-insulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor and label as spare.

7. Power and Lighting Circuits:
   a. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and larger.
   b. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps on lighting and receptacle circuits.
   c. Use split bolt connectors for copper wire splices and taps, 6 AWG and larger.

8. Controls Circuits
   a. Control circuit conductors shall terminate at terminal blocks only. Control cable shall never be spliced except the final connection to field devices.
   b. If stranded conductors used for #10 or smaller for controls, FA, security, etc, install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

G. Terminal Lugs
   1. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.
   2. Size lugs in accordance with manufacturer’s recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.
   3. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

H. Control Wiring
   1. Run in separate conduits from building wiring.
   2. Departures from the sizes specified in Part 2 shall be made only in those cases in which the National Electrical Code requires the use of larger conductors.
   3. The Contractor may, if he deems it necessary or advisable, use larger sized conductors than those shown.

I. Wiring Within An Enclosure:
   1. Contractor shall bundle AC and DC wiring separately within an enclosure.
   2. The Contractor shall utilize panel wire-ways when they are provided.
   3. Where wireways are not provided, the Contractor shall neatly tag and bundle wires and secure to sub-panel at a minimum of every three inches.

J. Separate neutral conductors shall be provided for each single phase circuit.

K. Where terminations of cables that are installed under this Section are to be made by others, provide pigtail of adequate length for neat, trained and bundles connections, minimum 5 feet at each location, unless noted otherwise on drawings.

L. Do not band any conductor either permanently or temporarily during installation to radii less than four times the outer diameter of 600-volt insulated conductors.
3.5 WIRE COLOR

A. General:
   1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following for each phase A, B, C, and Neutral:
      a. Red (A), Black (B) for single phase circuits at 120/240 volts.
      b. Red (A), Black (B), Blue (C) for circuits at 120/208 volts single or three phase.
   2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Use colors listed above.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
   1. For 6 AWG and smaller: Green.
   2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.6 FIELD QUALITY CONTROL

A. Before final acceptance, the Contractor shall make voltage, insulation, and load tests, necessary to demonstrate to the Owner’s representative the satisfactory installation and proper performance of all circuits.

B. All terminations rated 60A or larger shall be made using a torque wrench and the results recorded in a log to be provided to owner with closeout documents.

   1. Test results below 50 megohms shall be cause for rejection of the wiring installation.
   2. Replace and retest all non-compliant conductors.
   3. Provide written log of testing results to owner with closeout documents.

END OF SECTION
SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Rod electrodes.
2. Wire.
3. Mechanical connections.
4. Exothermic connections.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:

C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.

D. Uniform General Conditions, including Supplementary General Conditions.

E. Division 1 – General Requirements, Section 01000 – Special Conditions.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and grounding electrodes.

B. Field Quality-Control Test Reports: Report certified by field testing agent indicating results of performance testing required in Part 3 and/or on plans. Indicate overall resistance to ground and resistance of each electrode.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: A licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work. Where noted in the specifications or
required by the manufacturer, installer shall be a manufacturer trained and/or certified installer of the specific product to be installed.

1.5 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

B. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

C. Source Limitations: All components required for a complete functioning system as described here in shall be obtained through one source from a single manufacturer.

D. Maintain one copy of each document on site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Store in clean, dry space located above grade and protect from dirt, water, construction debris, traffic, chemical and mechanical damage, freeze, and where applicable, deterioration from sunlight. Store in original packaging where possible.

C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.7 COORDINATION

A. Complete grounding and bonding of building reinforcing steel prior to concrete placement.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products that are compliant with these specifications and produced by the following manufacturers are acceptable
   1. Copperweld, Inc
   2. Erico, Inc.
   3. ILSCO Corporation
   4. O-Z Gedney Co.
   5. Thomas & Betts, Electrical.

B. Substitutions: With engineer approval.
2.2 ROD ELECTRODES

A. Product Description:
   1. Material: Copper.
   3. Length: 10 feet.

B. Connector: Connector for exothermic welded connection.

2.3 GROUNDING AND BONDING WIRE

A. Material:
   1. Match building wiring material specifications
   2. Except where noted bare, match building wiring insulation.
   4. Solid copper may be used for #8 AWG and smaller.

B. Foundation Electrodes: 4 AWG bare, strand copper.

C. Grounding Electrode Conductor: stranded Copper conductor bare.

D. Grounding Straps: Tin plated copper braided cable, 1" thick x 0.1" thick (min), #1 awg, with ¾" one hole connections on both ends (note: other connection types may be noted on plans)

2.4 MECHANICAL CONNECTORS

A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

B. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

C. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

2.5 EXOTHERMIC CONNECTIONS

A. Product Description: Exothermic welding kits, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify final backfill and compaction has been completed before driving rod electrodes.
3.2 PREPARATION

A. Remove paint, rust, mill oils and surface contaminants at connection points.

3.3 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations when noted as scope on the plans.

B. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

3.4 SERVICE ENTRANCE GROUNDING ELECTRODE SYSTEM

A. Install grounding electrode system as required by NEC. At a minimum, a grounding electrode conductors shall be extended to:
   1. The building metal code water piping, bolted connection.
   2. Structural steel framing, welded connection.
   3. 20 ft of bare copper encased in concrete, ufer ground.
   4. 20 ft of bare copper conductor buried at 24” or driven ground rods.
   5. Additional electrodes as required to achieve minimum ground impedance as specified below.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
   1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
   2. Install grounding well pipe with cover at rod locations as indicated on Drawings. Install well pipe top flush with finished grade.

C. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, using a minimum of 20 feet of bare copper conductor sized per plans but not smaller than No. 4 AWG:
   1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
   2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to grounding electrode external to concrete.

D. Grounding and Bonding for Piping:
   1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building’s main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically by pass water meters. Connect pipe with a bolted connector.
3. Bond each above ground portion of gas piping system downstream from equipment shutoff valve.

E. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.

F. Install grounding electrode conductor and connect to reinforcing steel in foundation footing.

G. Connect to existing site grounding system where applicable

H. Additional grounding electrode requirements and grounding electrode conductor sizes are shown on the plans.

3.5 INSTALLATION

A. Permanently ground and bond the entire light and power system in accordance with NEC, including service equipment, feeders and branch circuits electrical panels, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

B. General Requirements
1. Install in accordance with IEEE 142, NEC requirements, and manufacturer’s recommendations.
2. Install grounding and bonding conductors concealed from view.
3. Routing of grounding electrode, special systems ground conductors, and other grounds not routed in feeders or branch circuit raceways shall be installed in a dedicated metal conduit in all locations subject to physical abuse or environmental deterioration such as exterior mounted, exposed below ceiling, etc.
4. Ground system using separate insulated grounding conductor installed with every feeder and branch circuit conductors in conduits. Terminate each end on suitable lug, bus, or bushing.
5. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes, equipment ground terminal, or metal enclosures of equipment.
6. Raceway systems shall be made continuous from source to load.
   a. Provide bonding jumpers were raceway system is inherently discontinuous such as where conduits terminate at cable trays.
   b. Raceway shall be made continuous using mechanical connections that have been securely tightened using the appropriate tool. Hand tight is not acceptable.
7. Permanently attach equipment and grounding conductors prior to energizing equipment.
8. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors
9. Provide grounding bushings for conduit terminations at panels, electrical equipment, enclosures, etc.
C. Bonding Straps and Jumpers:
   1. Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
   2. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
   3. Bonding to Equipment Mounted on Vibrations Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
   4. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
   5. Bond the following components to the grounding electrode
      a. System neutral at service entrance
      b. Service equipment enclosures, exposed non-current carrying metal parts of electrical equipment
      c. Metal raceway systems, auxiliary gutters, meter fittings, boxes, cable armor, cable sheath
      d. Metal siding not attached to grounded structure; bond to ground.

D. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors

3.6 FIELD QUALITY CONTROL

A. Grounding System Resistance: 5 ohms maximum.

B. Perform ground resistance testing
   1. Test in accordance with IEEE 142.
   2. Provide additional grounding electrodes as required to achieve resistance listed above.
   3. Testing shall be performed when the soil is dry and there has been no rain in the past 48 hours.

C. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION
SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Conduit supports.
   2. Formed steel channel.
   4. Equipment bases and supports.

1.2 REFERENCES

A. FM Global:
      Factory Mutual Research For Property Conservation.

B. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

C. Underwriters Laboratories Inc.

D. Uniform General Conditions, including Supplementary General Conditions.

E. Division 1 – General Requirements, Section 01000 – Special Conditions.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this
   section with minimum three years documented experience.

B. Supplier: Authorized distributor

C. Installer: A licensed electrician with documented experience installing all equipment
   specified here in shall directly supervise all work. Where noted in the specifications
   or required by the manufacturer, installer shall be a manufacturer trained and/or
   certified installer of the specific product to be installed.

1.4 QUALITY ASSURANCE

A. Source Limitations: All components required for a complete functioning system as
   described here in shall be obtained through one source from a single manufacturer.

B. Listing and Labeling: Where required, all electrical components, devices, and
   accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a
   testing agency acceptable to authorities having jurisdiction and marked for the
intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

PART 2 - PRODUCTS

2.1 CONDUIT SUPPORTS

A. Manufacturers:
   1. Allied Tube & Conduit Corp.
   2. Electroline Manufacturing Company
   3. O-Z Gedney Co.
   4. Thomas & Betts
   5. Substitutions: With engineer approval.

B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt and nut to tighten.

E. Conduit straps - general purpose:
   1. One hole zinc plated steel for surface mounted conduits 1" or less.
   2. Two hole zinc plated steel for surface mounted conduits greater than 1"

2.2 CABLE TIES

A. High strength nylon temperature rated to 185 degrees F.

B. Self Locking

2.3 FORMED STEEL CHANNEL

A. Manufacturers:
   1. Allied Tube & Conduit Corp.
   2. B-Line Systems
   3. Midland Ross Corporation, Electrical Products Division
   4. Thomas & Betts
5. Unistrut Corp.

B. Product Description:
   2. Holes 1-1/2 to 2 inches on center.
   3. Provide angle brackets and other accessories from the same manufacture and from the same materials with the same finish.

C. Provide heavier gage channel where the weight of the equipment exceeds the ratings of the products specified above.

D. Steel Pipe Straps
   1. Provide straps from the same manufacturer and of the same material and finish as channel.
   2. Bolt head combination slot and hex head with square nut.
   3. Conduit size engraved in strap for easy identifications.
   4. Design load of 500lbs min.

2.4 SPING STEEL CLIPS

A. Product Description: Mounting hole and screw closure.

2.5 BOX SUPPORTS

A. Outlet boxes
   1. Provide between stud box mounting brackets secured to the two adjacent studs.
   2. Provide two self tapping screws on each side to secure bracket to stud.
   3. Where two studs are not available, provide far side box support strap.

B. Pull and Junction boxes
   1. Provide threaded hangers and channel supports for pull and junction boxes suspended from ceiling.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove incompatible materials affecting bond.

B. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.2 INSTALLATION - HANGERS AND SUPPORTS

A. General Requirements
   1. Support raceways using galvanized steel or malleable iron straps, channel, and/or beam/pipe clamps as appropriate.
2. Install conduit and raceway support and spacing in accordance with NEC.
   a. Provide supports at all boxes, elec equipment, and loads
   b. Provide supports at code required intervals along raceways.
3. Support independent of other systems. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
4. Install multiple conduit runs on common hangers. Provide spare capacity on support elements where more than three conduits are grouped together.

B. Anchors and Fasteners:
   1. Concrete Structural Elements: Provide precast inserts, expansion anchors and preset inserts.
   2. Steel Structural Elements: Provide beam clamps, spring steel clips, and welded fasteners.
   3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
   5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
   7. Wood Elements: Provide wood screws.

C. Inserts:
   1. Install inserts for placement in concrete forms.
   2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut.

D. Supports:
   1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
   2. Install surface mounted boxes, cabinets, and panelboards with minimum of four anchors.
   3. Install surface mounted device boxes with a minimum of two anchors, secure boxes in stud walls to the studs on both sides of the box.
   4. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
   5. Support vertical conduit at every floor.

3.3 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of 3000 PSI concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
C. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

3.4 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION
SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Conduit and tubing
   2. Surface raceways
   3. Wireways
   4. Outlet boxes
   5. Pull and junction boxes
   6. Enclosures and Cabinets

B. Related Sections:
   1. The requirements of this specification shall be followed when installing raceway for all mechanical, controls, electrical, and special systems work covered by other specifications.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
   2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

B. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
   3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
   4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
   5. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
   6. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

C. Underwriters Laboratories Inc.:
   1. Products shall be listed where required by the NEC

D. Uniform General Conditions, including Supplementary General Conditions.

E. Division 1 – General Requirements, Section 01000 – Special Conditions.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents:
   1. Record actual routing of conduits larger than 2 inch.
2. Record actual locations and mounting heights of outlet, pull, and junction boxes larger than 4x4.

1.4 COORDINATION

A. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.

B. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: A state licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work. Where noted in the specifications, required by code, or required by the manufacturer, installer shall be a manufacturer trained and/or certified installer of the specific product to be installed.

1.6 QUALITY ASSURANCE

A. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store in clean, dry space located above grade and protect from dirt, water, construction debris, traffic, freeze, and where applicable, deterioration from sun light.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to the requirements of the specifications, products by the following manufacturers may be used for raceways and boxes. UL listed substitutions that are compliant with these specifications are acceptable provided compliance with all specification requirements are clearly indicated on the submittal.

1. Apleton
2. Carlon Electrical Products
3. Hubbell Wiring Devices
4. Thomas & Betts Corp.
5. Walker Systems Inc.
6. The Wiremold Co.
7. Wheatland Tube Company
8. Allied Tube & Conduit
9. B I A
10. Cantex
11. Southwire
12. Eastern
13. Pass & Seymour
14. Hoffman

2.2 SYSTEM DESCRIPTION

A. Provide raceway and boxes as specified below for power and lighting.

B. Underground:
   1. Provide wrapped rigid steel conduit for 1" or larger elbows and where entering
      and exiting slabs or ground.
   2. Provide thick-wall nonmetallic conduit for straight runs that are buried and/or in
      concrete.
   3. Provide high-grade plastic boxes or polymer concrete boxes. Coordinate with
      engineer.
   4. Provide boxes for utility service conduit or cabling per utility provider’s
      specifications
   5. Provide rigid steel conduit within 5 ft of building foundation.

C. In Concrete:
   1. Provide wrapped rigid steel conduit for 1" or larger elbows and where entering or
      exiting concrete.
   2. Provide thick-wall nonmetallic conduit for straight runs in concrete.
   3. Provide high-grade plastic boxes or polymer concrete boxes. Nonmetallic may
      be used with engineer approval.
   4. Use concrete tight, masonry rated boxes and fittings were installed in concrete,
      stone, brick, or CMU.

D. Exterior Above Grade and Wet/Damp Interior Locations:
   1. Provide rigid steel conduit and fittings.
   2. Provide cast metal outlet, junction, and pull boxes boxes, gasketed, rated NEMA
      3R min.

E. Concealed Dry Interior Locations (Non-Family Dwellings):
   1. Provide rigid steel conduit, intermediate metal conduit, or electrical metallic
      tubing.
   2. Provide sheet-metal boxes.

F. Exposed Dry Interior Locations (Non-Family Dwellings):
   1. Provide rigid steel conduit below 10 feet, and rigid steel, intermediate metal, or
      electrical metallic tubing above 10 feet.
   2. Provide sheet-metal boxes.
2.3 METAL CONDUIT

A. Rigid Steel Conduit:
   1. ANSI C80.1.
   3. Continuously welded seams.
   4. Uniform wall thickness and cross section.
   5. Manufacturer applied lubricating and corrosion retarding coating applied to interior of conduit.

B. Rigid Aluminum Conduit:
   1. ANSI C80.5.
   2. Continuously welded seams
   3. Uniform wall thickness and cross section

C. Intermediate Metal Conduit (IMC): Rigid steel.

D. Fittings and Conduit Bodies:
   1. NEMA FB 1
   2. Material to match conduit.
   3. Couplings and connectors: threaded
   4. Expansion Fittings: OZ Type DX, concrete tight, provide for ¾" movement in all directions and or 30 degrees deflection in any direction

2.4 FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction.

B. Fittings: NEMA FB 1.

C. FMC shall be used in the following locations
   1. For lighting whips
   2. For connections to vibrating equipment
   3. In applications where rigid conduit can not be installed without extensive demolition, but only with engineer’s approval.

2.5 LIQUIDtight FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction with PVC jacket.

B. Fittings: NEMA FB 1.

C. Use LFMC for all exterior vibrating equipment loads and in pump rooms that contain large quantities of mechanical and plumbing piping in the vicinity of the flex conduit.

2.6 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description:
   1. ANSI C80.3
2. Material: galvanized tubing, manufactured from mild steel
3. Continuously welded seams
4. Uniform wall thickness and cross section
5. Manufacturer applied lubricating and corrosion retarding coating applied to interior of conduit

B. Fittings and Conduit Bodies:
1. NEMA FB 1
2. Material: zinc plated steel
3. Concrete tight
5. Expansion Fittings: OZ Type TX

2.7 NONMETALLIC CONDUIT

A. Product Description: NEMA TC 2; Schedule 40 and 80 PVC.
   1. Schedule 40 PVC may be used where buried or embedded.
   2. Use schedule 80 PVC conduit for any exposed exterior or interior applications requiring corrosive resistant PVC conduit such as pool pump rooms.

B. Fittings and Conduit Bodies: NEMA TC 3.

2.8 OUTLET BOXES

A. Sheet Metal Outlet Boxes:
   1. NEMA OS 1
   3. 4"x4", 2" deep, unless noted otherwise
   4. Concentric knockouts
   5. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
   6. Concrete Ceiling Boxes: Concrete type.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

C. Cast Boxes: NEMA FB 1, Type FD, aluminum or cast ferolloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 26 27 26.

E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

F. Outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, mud rings extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual situations.

G. Provide multi-gang outlets of single box design. Sectional boxes are not acceptable. Provide outlet boxes of sufficient volume to accommodate the number of conductors
entering the box in accordance with the requirements of NEC, and not less than 1-1/2 inch deep unless shallower boxes are required by structural conditions and are approved by the A/E.

H. Provide deep type cast metal weatherproof exterior outlet wiring boxes of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket and fasteners. Provide PVC type outlet boxes only in corrosive areas rated as NEMA 4X.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Provide complete raceway systems from source to all loads with dedicated supports for each raceway element.

B. Provide all required back boxes and supports for wiring devices.

C. Provide pull box at appropriate locations for all power and special systems raceways whether shown on plans or not.

D. Arrange raceway and boxes to present a neat appearance; allow for future expansion; provide access where needed; and maintain headroom and clearances for equipment, egress, etc.
E. Fasten raceway and box supports to structure and finishes in accordance with all requirements of the NEC and the construction documents.

F. Ground and bond raceway and boxes in accordance with all requirements of the NEC and the construction documents.

G. Identify raceway and boxes in accordance with all requirements of the NEC and the construction documents.

H. Paint exposed raceway and boxes to match the surface to which they are attached.

3.4 INSTALLATION - RACEWAY

A. Raceway Supports
   1. Support raceway using galvanized steel, malleable iron straps, or channel and pipe clamps.
   2. Provide support at each junction box, panel and load.
   3. Provide supports at intervals per code and manufacturer recommendations.
   4. Group related raceway and support using steel channel conduit rack. Provide space on each for 25 percent additional raceways.
   5. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports.
   6. Do not attach raceway to ceiling support wires or other piping systems such as sprinkler or HVAC piping or duct work.
   7. Support cables in vertical raceways per NEC 300.19.
   8. Construct wireway supports from steel channel.
   9. Arrange raceway supports to prevent misalignment during wiring installation.
   10. Additional supporting requirements are specified in other specification sections.

B. Raceway Routing
   1. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
   2. The conduit routing shown on the construction documents is diagrammatic.
      a. Coordinate interior routing with other trades; structure; existing and new utilities, ductwork, piping; and other existing conditions as required for a complete, conflict free installation.
      b. Coordinate site routing with other trades; structure; new and existing buried utilities, new and existing paved areas, conduit sleeves, and landscaping before digging to avoid conflicts, damage, and to allow for future installations.
   3. Route raceway parallel and perpendicular to walls, floors, and ceilings.
   4. Route exposed conduit parallel to structural elements. Follow all surface contours; do not route in free air from point to point. Where physically possible, install on top side of structural elements to conceal from view. Paint to match structure to which it is attached.
   5. Route conduit in and under slab from point-to-point. Coordinate conduit installations in slab, except straight slab penetrations with structural engineer for conduits larger than 2”
   6. Maintain clearance between raceway and piping for maintenance purposes.
7. Maintain 12 inch clearance between power raceways and communications cabling, raceways, and cable trays.
8. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
9. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Use factory elbows or hydraulic one-shot bender to fabricate elbows for bends in metal conduit larger than 2 inch size.

C. Install raceways so that it drains to junction and pull boxes to avoid moisture traps at low points; install junction box with drain fitting at low points in conduit system.

D. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

E. Close ends and unused openings in surface raceways, wireways, boxes, and enclosures.

F. Maximum Size Conduit in Slab Above Grade: 3/4 inch. Do not cross conduits in slab without approval.

G. Cut conduit square using saw or pipe cutter; de-burr cut ends.

H. Bring conduit to shoulder of fittings; fasten securely.

I. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

J. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

K. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

L. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

M. All connections to motors, instruments, machines, and equipment subject to movement or vibration shall be made using liquid-tight flexible metal conduit (3ft max).

3.5 INSTALLATION – BOXES, ENCLOSURES, CABINETS

A. General Requirements
   1. Seal all unused openings.
   2. Provide flush mounted boxes in finished areas.
   4. Install boxes without damaging or removing insulation, cutting structural elements, or damaging finishes.
5. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

B. Wiring Device Boxes
1. Install gang box where more than one device is mounted together. Do not use sectional box.
2. Install gang box with plaster ring for single device outlets.
3. Adjust mounting locations to be flush with finished surface.
5. Do not install flush mounting box back-to-back in walls
   a. Install with minimum 6 inches separation.
   b. Install in separate stud bays to reduce noise transfer where ever possible.
   c. Install with minimum 24 inches separation in acoustic rated walls.
6. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings. Refer to architectural elevations for mounting heights of outlet boxes noted "above counter."
7. Orient boxes to accommodate wiring device orientation. Field verify with architect for wiring devices mounted above counters or exposed to view in lobbies, on display walls, etc.
8. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

C. Ceiling Mounted Boxes
1. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
2. Install adjustable steel channel fasteners for hung ceiling outlet box.
3. Do not fasten boxes to ceiling support wires or other piping systems.

D. Masonry Walls and Poured In Concrete
1. Install recessed boxes in the corner of masonry blocks so that only the corner of one masonry element is required to be cut.
2. File smooth the edges of cut masonry blocks. Replace cracked or damaged blocks.
3. Seal concrete tight all openings in boxes prior to pouring concrete.
4. Verify box is level and flush with finished grade. File down edges that protrude above finished grade.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Locate outlet boxes to allow luminaires positioned as indicated on reflected ceiling plan.

B. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.
B. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION
SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes
   1. Branch circuit panelboards

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC
      Power Circuits.

B. National Electrical Manufacturers Association:
   1. NEMA PB 1 - Panelboards.
   2. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and
      Maintenance of Panelboards Rated 600 Volts or Less.

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories Inc.:
   1. UL 67 - Safety for Panelboards.

E. Uniform General Conditions, including Supplementary General Conditions.

F. Division 1 – General Requirements, Section 01000 – Special Conditions.

1.3 SUBMITTALS

A. Shop Drawings: Manufacturer or contractor prepared drawings showing all relevant
   dimensions, weights, mounting requirements, and conduit entry points.
   1. Include dimensioned plan views and elevations.

B. Product Data: Submit catalog data showing all standard features, dimensions, weights,
   listings and product labels, material types, finishes and clearly indicating which optional
   features will be provided.
   1. Include amperage ratings, voltage, over-current protective device ratings, AIC
      ratings.
   2. Where multiple sizes are listed, indicate sizes to be used.
   3. Where multiple products are shown on the same page, indicate which products to
      be used.
1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of electrical equipment and record actual circuiting arrangements.

B. Operation and Maintenance Data:
   1. Provide product data as defined under submittals.
   2. Provide manufacturer’s installation and maintenance instructions for normal operation, routine maintenance and testing, and emergency maintenance procedures.
   3. Submit spare parts listing; source of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
   1. Manufacturer shall maintain or certify an independently operated service center capable of providing training, support, parts, and maintenance services.

B. Supplier: Authorized distributor

C. Installer: A licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work. Where noted in the specifications or required by the manufacturer, installer shall be a manufacturer trained and/or certified installer of the specific product to be installed.

1.6 QUALITY ASSURANCE

A. Source Limitations: All components required for a complete functioning system as described here in shall be obtained through one source from a single manufacturer.

B. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

1.7 WARRANTY

A. Provide manufacturer’s standard form clearly stating that manufacturer agrees to repair or replace equipment, materials, and associated auxiliary components that fail or deteriorate within the specified warranty period.

B. Warranty Period: one(1) year from the date of substantial completion

1.8 DELIVERY STORAGE AND HANDLING

A. Store in clean, dry space located above grade and protect from dirt, water, construction debris, traffic, freeze, and where applicable, deterioration from sun light.
B. Maintain factory wrapping or provide additional canvas or plastic cover for all large electrical equipment. Follow all manufacturer recommendations for humidity and max/min temperatures for storing electrical equipment.

1.9 MAINTENANCE MATERIALS

A. Furnish four of each panelboard key. Panelboards keyed alike.

PART 2 - PRODUCTS

2.1 BRANCH CIRCUIT PANELBOARDS

A. Manufacturers:
   1. Eaton
   2. Siemens
   3. Square D
   4. Substitutions: With engineer approval.

B. Product Description: NEMA PB 1, circuit breaker type, lighting and appliance branch circuit panelboard.

C. Panelboard Bus:
   1. Copper current carrying components, ratings as indicated on Drawings.
   2. Furnish copper ground bus in each panelboard.
   3. Furnish fully rated copper neutral bus in each panelboard.

D. Minimum Integrated Short Circuit Rating: 10KAIC unless higher value indicated on Drawings.

E. Molded Case Circuit Breakers: NEMA AB 1, plug-in type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as:
   1. Type SWD for lighting circuits.
   2. Type HACR for air conditioning equipment circuits.
   3. Class A ground fault interrupter circuit breakers as indicated on Drawings.
   4. UL 1699 compliant arc fault circuit interrupter for all circuits serving receptacles in every room of dwelling units.
   5. Do not use tandem circuit breakers.

F. Enclosure: NEMA PB 1, Type 1 unless noted otherwise
   1. 6 inches deep, 20 inches wide.
   2. Cover: Flush cabinet front.
   3. Door: continuous hinge, metal directory frame, and flush lock keyed alike.
   4. Finish in manufacturer's standard gray enamel except as noted in 5 and 6.
   5. For panels on building exteriors in visible locations, paint to match surface to which they are attached.
PART 3 - EXECUTION

3.1 EXISTING WORK

A. Maintain access to existing panelboard remaining active and requiring access. Modify installation or provide access panel.

B. Clean and repair existing panelboards to remain or to be reinstalled.

3.2 INSTALLATION

A. Install panelboards:
   1. In accordance with NEMA PB 1.1.
   2. Plumb with adjacent walls and supports.
   3. Flush with wall finishes if recessed in wall.
   4. By securing all four corners to the adjacent structure using appropriate supports.
   5. On concrete pads if floor mounted.

B. Provide each panel with:
   1. Filler plates for unused spaces in panelboards.
   2. Typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads.
   3. Engraved plastic nameplates identifying panel name, source, amperage, and voltage.

C. Mounting Requirements
   1. Elec/Mech Rms, Closets: Surface mount using u-channel supports behind panel to stand panel off wall. In constrained spaces, panels may be secured directly to the wall where required to provide access to equipment, meet egress requirements, or NEC working space requirements.
   2. Finished Corridors: Recess mount panels in wall. Coordinate with general contractor to ensure wall thickness is adequate to flush mount panels. (6" studs, typical).
   3. Exterior Building Walls: Surface mount using galvanized u-channel supports behind panel to stand panel off wall.
   4. Mounting Height:
      a. Interior Spaces: 6 feet to top of panelboard.
      b. Install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
      c. Exterior: To help shield from view, mount panels as low as practical. Bottom of panel shall be at least 18" AFG unless floor mounted or mounted over concrete, asphalt, etc.

D. Install spare conduits out of each recessed panelboard to accessible location above ceiling. Minimum spare conduits: 5 empty 1 inch. Identify each as SPARE.

E. Grounding
   1. Ground and bond panelboard enclosure according to grounding specifications and code.
2. Connect equipment ground bars of panels in accordance with NFPA 70.

3.3 FIELD QUALITY CONTROL

A. Tighten all accessible electrical connections to the manufacturer’s torque specifications.

B. Remove all blocks, packing and shipping materials, and foreign materials.

C. Manually exercise all switches, circuit breakers, and other operating mechanisms to make certain they operate freely.

D. Check integrity of all electrical and mechanical interlocks and padlocking mechanisms.

E. Conduct an insulation resistance test phase to ground and phase to phase with the OCPDs in both the open and closed position. Resistance in open position shall be 1 megohm min. Remediate and retest if resistance is less. Verify that any metering or surge protection equipment that could be damaged by this testing has been disconnected and or removed as needed for testing.

F. Test all ground fault protection systems in accordance with the manufacturer’s instructions.

3.4 ADJUSTING

A. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION
SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes
   1. Wall switches
   2. Wall dimmers
   3. Receptacles
   4. Device plates and decorative box covers.
   5. Occupancy sensors
   6. Photocells (Daylight sensors)

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

B. Uniform General Conditions, including Supplementary General Conditions.

C. Division 1 – General Requirements, Section 01000 – Special Conditions.

1.3 SUBMITTALS

A. Product Data: Submit catalog data showing all standard features, dimensions, weights, listings and product labels, material types, finishes and clearly indicating which optional features will be provided.
   1. Include amperage and voltage ratings.
   2. Include color to be used for each wiring device. Architect to select and approve device colors
   3. Device and cover plate shall not be ordered until color selections are approved in writing by architect.
   4. Where multiple sizes are listed, indicate sizes to be used.
   5. Where multiple products are shown on the same page, indicate which products to be used.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of each floor box and poke-through fitting.

B. Operation and Maintenance Data:
   1. Provide product data as defined under submittals.
2. Provide manufacturer's installation and maintenance instructions for normal operation, routine maintenance and testing, and emergency maintenance procedures.
3. Submit spare parts listing; source of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Supplier: Authorized distributor

C. Installer: A licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work. Where noted in the specifications or required by the manufacturer, installer shall be a manufacturer trained and/or certified installer of the specific product to be installed.

1.6 QUALITY ASSURANCE

A. Source Limitations: All components required for a complete functioning system as described here in shall be obtained through one source from a single manufacturer.

B. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

1.7 WARRANTY

A. Warranty Period: one(1) year from the date of substantial completion

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Wiring device type and color shall be location specific.
   1. In general, use "architectural style" devices in public areas and heavy duty device in back of house.
   2. Device color shall be selected by architect.
   3. Use white devices if and only if no selection is made by architect.

2.2 WALL SWITCHES

A. Manufacturers:
   1. Cooper Wiring Devices
   2. Harvey Hubbell, Inc.
   3. Leviton Manufacturing Company.
4. Substitutions: With engineer approval.

B. Product Description:
   1. NEMA WD 1, General-Duty, commercial grade, AC only general-use snap switch, 
      unless noted otherwise
   2. Provide heavy duty industrial grade switches in janitor's closet, mechanical rooms, 
      manufacturing areas, and labs.
   3. One-piece brass integral ground terminal

C. Ratings:
   1. Voltage: 120-277volts, AC.
   3. 1HP-120V, 2HP 240-277V

D. Body and Handle:
   1. Nylon.
   2. Provide rocker switches in finished areas.
   3. Provide toggle switches in un-finished areas such as janitor's closet, mechanical 
      rooms, manufacturing areas, and labs.

2.3 WALL DIMMERS

A. Manufacturers:
   1. Cooper Wiring Devices
   2. Harvey Hubbell, Inc.
   3. Leviton Manufacturing Company.
   4. Substitutions: With engineer approval.

B. Product Description:
   1. NEMA WD 1
   2. Dimmer shall be compatible with LED line voltage dimming, not 0-10V.

C. Body and Handle:
   1. Slide dimmer
   2. Nylon
   3. Push button on off control

D. Voltage: 120-277 volts.

E. Power Rating: Match load shown on drawings, 1000W minimum

F. Accessory Wall Switch: Match dimmer appearance.

2.4 RECEPTACLES

A. Manufacturers:
   1. Cooper Wiring Devices
   2. Harvey Hubbell, Inc.
   3. Leviton Manufacturing Company.
4. Substitutions: With engineer approval.

B. Product Description:
   1. NEMA WD 1, General-duty, specification grade receptacle, unless noted otherwise.
   2. Provide heavy duty industrial grade receptacles in janitor's closets, mechanical rooms.
   3. One-piece brass integral ground straps
   4. Ground retention clips
   5. Back wired ground terminals
   6. Face and body: nylon

C. Minimum rating: 20A, 125V

D. Configuration: NEMA WD 6, type as indicated on Drawings.

E. Convenience Receptacle:
   1. Type 5-20, unless noted otherwise
   2. 2 pole, 3 wire grounding

F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

G. USB Charging Receptacles:
   1. Each USB/Duplex receptacle combination shall have:
      a. Two USB 2.0 ports
      b. 2.0 Amps, 5 Volts DC, Type A.
      c. USB port shall be rated for at minimum 10,000 insertions and removals

2.5 WALL PLATES

A. Manufacturers:
   1. Provide product by the manufacturer of the wiring device being covered by the wall plate

B. Decorative Cover Plate: Nylon to match receptacle color. Coordinate color and finish with architect.

C. Weatherproof Cover Plate: Nylon plate with gasketed device cover. Coordinate color, finish, and/or painting requirements with architect.

2.6 LIGHTING CONTACTORS

A. Manufacturers:
   1. Automatic Switch Co.
   2. Eaton
   3. General Electric
   4. Square D
5. Siemens

B. Product Description:
   1. NEMA ICS 2, magnetic lighting contactor.
   2. Configuration: Electrically held, 2 wire control.
   3. Coil Operating Voltage: 24 or 120 volts, 60 Hertz.
   4. Poles: To match circuit configuration and control function.
   5. Contact Rating: Conductor overcurrent protection, considering derating for continuous loads.

C. Accessories:
   2. Selector Switch: ON/OFF/AUTOMATIC function, with rotary action.
   3. Auxiliary Contacts: one normally open and one normally closed in addition to seal-in contact.
   5. Control Power Transformers: 120 volt secondary, VA as required, in each enclosed contactor. Furnish fused primary and secondary, and bond unfused leg of secondary to enclosure.

D. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer’s standard gray enamel.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

2.7 OCCUPANCY SENSOR

A. Manufacturers:
   1. Cooper
   2. Douglas Lighting Controls
   3. Hubbell
   4. Leviton
   5. Lutron
   6. Watt Stopper
   7. Substitutions: With engineer approval.

B. Product Description:
   1. Devices shall include both infrared and ultrasonic sensing (elsewhere noted dual technology or multi-technology)
   2. Separate sensitivity and time delay adjustments with LED indication of sensed movement. User adjustable time-delay: 30 seconds to 30 minutes.
   3. Operation shall be silent.
   4. Integral daylight sensing with automatic shutoff at field adjustable light level.
   5. 1000VA at 120V, 2700VA at 277V rated
   6. 2000 sq ft coverage area.
      a. 1000 sq ft coverage may be used for room 800 sq ft or less, except restrooms and cubicle areas.
      b. 500 sq ft or less coverage devices shall not be used.
c. Ceiling mounted sensors
d. 360 degree sensing, unless noted 180 degree.
e. Ultrasonic sensors on both side of device, unless noted 180 degree.
f. Device shall be capable of being wired in parallel with additional occupancy sensors for large spaces.

7. Wall mounted sensors
   a. Integral on/off pushbutton
   b. 180 degree sensing

C. Programming
   1. Set off delay to 15 minutes minimum.
   2. Set off delay to 30 minutes in open office areas and restrooms.
   3. Any lighting within the space that is not controlled by the sensor should remain on throughout the programming process.

D. Corridor and Hallway Sensors:
   1. Capable of detecting motion 14 feet wide and 80 feet long with one sensor mounted 10 feet above floor.
   2. Capable of detecting motion in warehouse aisle 10 feet wide and 60 feet long or 100 feet long when mounted 22 feet above floor.
   3. Device shall be capable of being wired in parallel with additional occupancy sensors

2.8 PHOTOCELLS (DAYLIGHT SENSORS)

A. Manufacturers:
   1. Cooper
   2. Douglas Lighting Controls
   3. Hubbell
   4. Leviton
   5. Lutron
   6. Watt Stopper
   7. Substitutions: With engineer approval.

B. Product Description:
   1. Photoelectric light level sensor
   2. Separate sensitivity and time delay adjustments. User adjustable time-delay: 30 seconds to 30 minutes.
   3. Operation shall be silent.
   4. 1000VA at 120V, 2700VA at 277V rated
   5. 2000 sq ft coverage area.
      a. 1000 sq ft coverage may be used for room 800 sq ft or less, except restrooms and cubicle areas.
      b. 500 sq ft or less coverage devices shall not be used.
   6. Device shall be capable of being wired in parallel with additional sensors for large spaces.

C. Sensor Devices: Each sensor employs photo diode technology to allow linear response to daylight within illuminance range.
1. Exterior Lighting: Hooded sensor, horizontally mounted, employing flat lens, and working range 1-100 foot-candles in 10 percent increments. Entire sensor encased in optically clear epoxy resin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

D. Verify locations of floor boxes and outlets prior to rough in

3.2 PREPARATION

A. Clean debris from outlet boxes.

3.3 EXISTING WORK

A. Disconnect and remove abandoned wiring devices.

B. Modify installation to maintain access to existing wiring devices to remain active.

C. Clean and repair existing wiring devices to remain or to be reinstalled.

D. Maintain access to existing floor boxes remaining active and requiring access. Modify installation or provide access panel.

3.4 INSTALLATION

A. Install devices plumb and level.

B. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.

C. Install boxes and fittings to preserve fire resistance rating of slabs and other elements

D. Connect wiring devices by wrapping solid conductor around screw terminal.
   1. Install stranded conductor for branch circuits 10 AWG and smaller.
   2. When stranded conductors are used in lieu of solid, use crimp on fork terminals for device terminations.
   3. Do not place bare stranded conductors directly under device screws.

E. Wall Plates
1. Install wall plates on flush mounted switches, receptacles, and blank outlets.
2. Install decorative plates with concealed screws on switches, receptacles, and blank outlets in finished areas.
3. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
4. Use jumbo size plates for outlets installed in masonry walls.

F. Switches
1. Install switches with OFF position down.
2. Where multiple switches are installed at the same location, switches shall be ganged together.

G. Dimmers
1. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
2. Do not share neutral conductor on load side of dimmers.
3. Install dimmers on the load side of occupancy sensors and other controls.

H. Receptacles
1. Install receptacles with grounding pole on top.
2. Provide appropriate receptacle type for the application per the requirements listed in part 2 above.

I. Floor Boxes
1. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.
2. Set floor boxes level with finished floor. Smooth any edges that protrude above finished floors.
3. Provide a communications conduit with pull string from all floor boxes and poke throughs to the accessible ceiling on the level that the device serves or to the appropriate communications closet as required. Refer to plans for conduit size, 1" minimum.

J. Occupancy and photo sensors
1. Install ceiling mounted devices in center of area to be covered.
2. Install wall mounted devices at the typical switch location unless gimbal mounted.
3. Install gimbal mounted wall switches at 18" below ceiling.
4. Install 180 degree ceiling mounted devices at locations that are exposed to adjacent spaces from which false on signals could come.
5. Install gimbal mounted and 180 degree ceiling devices at edge of space facing towards the area to be covered and away from adjacent spaces from which false on signals could come.

K. Relays
1. Mount relay as indicated on Drawings. Wire numbered relays in panel to control power to each load. Install relays to be accessible. Allow space around relays for ventilation and circulation of air.
2. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.
3. Label each low voltage wire with relay number at each switch or sensor

3.5 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes with furniture and equipment.
B. Install wall switch 48 inches above finished floor.
C. Install convenience receptacle 18 inches above finished floor.
D. Install convenience receptacle 6 inches above back splash of counter.
E. Install dimmer 48 inches above finished floor.

3.6 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.
B. Operate each wall switch and occupancy sensor with circuit energized and verify proper operation.
C. Verify each receptacle device is energized.
D. Test each receptacle device for proper polarity.
E. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

A. Adjust devices and wall plates to be flush and level.
B. Adjust floor box flush with finish flooring material

3.8 CLEANING

A. Clean exposed surfaces to remove splatters and restore finish.
B. Clean interior of boxes to remove dust, debris, and other material.

END OF SECTION
SECTION 26 51 00 - LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes luminaires, lamps, and accessories.

1.2 REFERENCES

A. Uniform General Conditions, including Supplementary General Conditions.

B. Division 1 – General Requirements, Section 01000 – Special Conditions.

1.3 SUBMITTALS

A. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.

B. Product Data: Submit catalog data showing all standard features, dimensions, listings and product labels, material types, finishes and clearly indicating which optional features will be provided.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
   1. Manufacturer shall maintain or certify an independently operated service center capable of providing training, support, parts, and maintenance services.

B. Supplier: Authorized distributor

C. Installer: A licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work.

1.5 QUALITY ASSURANCE

A. Source Limitations: All components required for a complete functioning luminaire as described here in shall be obtained through one source from a single manufacturer.

B. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL.
1.6 WARRANTY

A. Provide manufacturer's standard form clearly stating that manufacturer agrees to repair or replace equipment, materials, and associated auxiliary components that fail or deteriorate within the specified warranty period.

B. Warranty Period:
   1. Three (3) years from the date of substantial completion for all LED fixtures.

1.7 DELIVERY STORAGE AND HANDLING

A. Store in clean, dry space located above grade and protect from dirt, water, construction debris, traffic, freeze, and where applicable, deterioration from sun light.

B. Maintain factory wrapping or provide additional canvas or plastic cover. Follow all manufacturer recommendations for humidity and max/min temperatures for storing.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Manufacturers:
   1. Manufacturers shall be as listed in the luminaire schedule
   2. Substitutions: With engineer approval.

B. Product Description: Complete luminaire assemblies, with features, options, and accessories as scheduled.

2.2 LED Lamps and Luminaires

A. Manufacturers
   1. Lamps:
      a. Philips
      b. Substitutions: With engineer approval.
   2. Luminaire Manufacturers shall:
      a. provide the manufacturer's name of the LED being used in the luminaire
      b. meet DOE's Energy Star or Design Light Consortium performance criteria
      c. registered as a DOE Quality Advocate

B. Product Description
   1. 50,000 hour rated
   2. Minimum CRI 80
   3. The CCT shall be 4000K
   4. total harmonic distortion (THD) <10%
   5. power factor ≥90%
   6. Luminaires shall be UL, or ETL, listed and be furnished complete with LEDs and power supplies
7. Minimum 3-year warranty covering all components.

C. Screw in Retrofit LED Lamps
   1. Retrofit LEDs shall follow all applicable product descriptions under B.
   2. Shall meet DOE’s Energy Star or Design Light Consortium performance criteria for qualified screw-in or pin-based LED lamps
   3. Shall have Lamp CCTs conforming to ANSI C78.377A color binning and utilize a 4 step MacAdam Ellipse Algorithm binning process (Philips Optibin or equal) within each retrofit lamp for greater CCT consistency
   4. Each lamp shall have total harmonic distortion (THD) <10%

PART 3 - EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned luminaires, lamps, and accessories.

B. Extend existing interior luminaire installations using materials and methods compatible with existing installations.

C. Clean and repair existing interior luminaires to remain or to be reinstalled.

3.2 PREINSTALLATION COORDINATION

A. Refer to architectural reflected ceiling plan for exact light fixture locations.

B. Examine the area of installation to verify adequate space and mounting provisions are provided for the specified luminaire prior to order luminaires.

C. Verify that luminaires will not interfere with required clearances for equipment such as HVAC equipment filter removal clearance, NEC working space in front of HVAC equipment control panels, etc.

D. Coordinate location of exit lights with structure and other MEP systems to insure that exit signs are clearly visible.

3.3 INSTALLATION

A. Lighting Conductors and Conduit
   1. Provide ground wire and one neutral conductor per circuit in all lighting conduit.
   2. All conductors serving luminaires shall be routed in conduit.
   3. Luminaire whips may be flexible metal conduit up to 6ft. Secure to structure with listed supports.
   4. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

B. Label all circuit breakers serving emergency lighting
C. Install suspended luminaires using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.

D. Install luminaires plumb, square, and level and aligned with ceilings, walls, and with each other and secure per manufacturer's printed instructions.

E. Recessed Luminaire Requirements
   1. Install recessed luminaires to permit removal from below.
   2. Install clips to secure recessed grid-supported luminaires in place.

F. Install wall-mounted luminaires at height as indicated on architectural drawings

G. Install accessories furnished with each luminaire.

H. Install specified lamps in each luminaire.

3.4 FIELD QUALITY CONTROL

   A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.5 ADJUSTING

   A. Aim and adjust luminaires.

3.6 CLEANING

   A. Remove dirt and debris from enclosures.

   B. Clean photometric control surfaces as recommended by manufacturer.

   C. Clean finishes and touch up damage.

3.7 PROTECTION OF FINISHED WORK

   A. Relamp luminaires having failed lamps at Substantial Completion.

END OF SECTION
SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Protecting existing vegetation to remain.
   2. Removing existing vegetation.
   3. Clearing and grubbing.
   4. Stripping and stockpiling topsoil.
   5. Removing above- and below-grade site improvements.
   6. Temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner’s property, cleared materials shall become Contractor’s property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Use sufficiently detailed photographs or videotape.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.
1.6 PROJECT CONDITIONS
A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
B. Do not commence site clearing operations until temporary erosion and sedimentation-control and plant-protection measures are in place.
C. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digs unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
D. Do not direct vehicle or equipment exhaust towards protection zones.
E. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
F. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
   1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION
A. Protect and maintain benchmarks and survey control points from disturbance during construction.
B. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL
A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain.
   2. Remove stumps of trees designated for removal on drawings.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.
   2. Fill in holes remaining after removal of tree stumps.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
   1. Limit height of topsoil stockpiles to 72 inches.
   2. Do not stockpile topsoil within protection zones.
   3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
   4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antitrust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.
3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION
SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Excavating and filling for rough grading the Site.
   2. Preparing subgrades for, slabs-on-grade, walks, and pavements.
   3. Excavating and backfilling for buildings and structures.
   4. Subbase course for concrete walks.
   5. Subbase course base course for asphalt paving.

B. Related Requirements:
   1. Section 033000 "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
   2. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
   3. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Do not commence earth-moving operations until temporary site fencing and erosion-and sedimentation-control measures specified are in place.

C. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

D. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

E. Do not direct vehicle or equipment exhaust towards protection zones.

F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification [Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487] [Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145], or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification [Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487] [Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145], or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Base Course: Crushed limestone base meeting TxDOT Item 247, Type A, Grade 1.
2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
   2. Remove rock to lines and grades indicated to permit installation of permanent construction.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
   a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

B. Excavations at Edges of Tree- and Plant-Protection Zones:
   1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-line spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
   2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
   2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
   3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
4. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
   1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. Trenches in Tree- and Plant-Protection Zones:
   1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
   2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
   3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.8 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
   1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
3.11 BACKFILL
A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, subdrainage, damproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring, bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 SOIL FILL
A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
B. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.
C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL
A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS
A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
   1. Under structures, building slabs, steps, and pavements, scarify and re-compact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
   2. Under walkways, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
   1. Turf or Unpaved Areas: Plus or minus 1 inch.
   2. Walks: Plus or minus 1 inch.
   3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot (3-m) straightedge.

3.16 SUBSURFACE DRAINAGE

A. Subdrainage Pipe: Specified in Section 334600 "Subdrainage."

B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch (150-mm) course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches (300 mm) of filter material, placed in compacted layers 6 inches (150 mm) thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).
   1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
   1. Compact each filter material layer [to 85 percent of maximum dry unit weight according to ASTM D 698] [with a minimum of two passes of a plate-type vibratory compactor].
   2. Place and compact impervious fill over drainage backfill in 6-inch-thick compacted layers to final subgrade.

3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
   1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase course and base course to required crown elevations and cross-slope grades.
4. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
5. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
6. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Install subdrainage geotextile on prepared subgrade according to manufacturer’s written instructions, overlapping sides and ends.
   2. Place drainage course 6 inches or less in compacted thickness in a single layer.
   3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
   2. Determine that fill material classification and maximum lift thickness comply with requirements.
   3. Determine, during placement and compaction that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of
other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.

2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.

3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and re-compact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.

1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION
SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section Includes:
   1. Concrete parking paving and walkway.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Other Action Submittals:
   1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 INFORMATIONAL SUBMITTALS
A. Material Certificates: For the following, from manufacturer:
   1. Cementitious materials.
   2. Steel reinforcement and reinforcement accessories.
   3. Admixtures.
   4. Curing compounds.
   5. Applied finish materials.
   6. Bonding agent or epoxy adhesive.
   7. Joint fillers.

1.5 QUALITY ASSURANCE
A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 PROJECT CONDITIONS
A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
   1. Use flexible or uniformly curved forms for curves. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT


B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

C. Deformed-Steel Wire: ASTM A 496/A 496M.

D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

E. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
   1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.


E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 CURING MATERIALS
A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.
B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
C. Water: Potable.
D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.5 RELATED MATERIALS
A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
B. Expansion Joint Sealant: Masterseal SL-1 sealant, limestone color, or approved equal.
C. Expansion Joint Cap: ½" Snap-Cap Expansion Joint Cap, or approved equal.

2.6 CONCRETE MIXTURES
A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
   1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
   2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
B. Proportion mixtures to provide normal-weight concrete with the following properties:
   2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
   3. Slump Limit: 4 inches, plus or minus 1 inch.

2.7 CONCRETE MIXING
A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
C. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION
   A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION
   A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
   B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT
   A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
   B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
   C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
   D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
   E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS
   A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
      1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
   B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
      1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
      2. Provide tie bars at sides of paving strips where indicated.
      3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
      4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
      5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
C. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch or 3/8-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
   a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
   a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

D. Expansion Joints: Install doweled 1/2" asphalt expansion joints at where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint. Cap top of asphalt expansion joint with 1/2" Snap-Cap Expansion Joint Cap. After concrete has cured remove top of Snap-Cap and seal top of joint limestone color Masterseal SL-1 sealant.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch or 3/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.
I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
   1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
   1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
   1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during
finishing operations. Apply according to manufacturer’s written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:
   1. Elevation: 3/4 inch.
   3. Lateral Alignment and Spacing of Dowels: 1 inch.
   5. Joint Spacing: 3 inches.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain at least one composite sample for each 5000 sq. ft. or fraction thereof of each concrete mixture placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day’s pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day’s pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13
SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section includes painted markings applied to asphalt pavement.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include technical data and tested physical and performance properties.

1.4 FIELD CONDITIONS
   A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 degrees F and not exceeding 95 degrees F.

PART 2 - PRODUCTS

2.1 PAVEMENT-MARKING PAINT
   A. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.
   B. Glass Beads: AASHTO M 247, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
   B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING
   A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with TPWD inspector.
   B. Allow paving to age for a minimum of 30 days before starting pavement marking or after manufacturer certifies the volatiles have dissipated or the paint is not affected.
   C. Sweep and clean surface to eliminate loose material and dust.
   D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
      1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb. /gal.
3. Replace asphalt and restripe if the paints curls and lifts any asphalt.

3.3 PROTECTING AND CLEANING
A. Protect pavement markings from damage and wear during remainder of construction period.
B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION
SECTION 32 92 00 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section Includes:
      1. Sodding.

1.3 QUALITY ASSURANCE
   A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
      1. Experience: Five years' experience in turf installation.

1.4 DELIVERY, STORAGE, AND HANDLING
   A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

1.5 FIELD CONDITIONS
   A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD
   A. Turfgrass Sod: Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
   B. Turfgrass Species: Density Buffalo grass (Buchloe dactyloides, variety Density) or approved equal Buffalo grass sod variety.

2.2 PLANTING SOILS
   A. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Retain first paragraph below if turf subgrades are stripped of surface soil or regraded by excavating, filling, or backfilling.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
   1. Loosen surface soil to a depth of at least 4 inches.
   2. Remove stones larger than 2 inches in any dimension and sticks, roots, trash, and other extraneous matter.
   3. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.3 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

C. Saturate sod with fine water spray immediately after planting.

3.4 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf.
B. Water daily or more frequently immediately after planting as necessary to maintain sod in a constant sponge wet condition during a two week establishment period or until sod is well rooted to the ground and cannot be pulled up. Sod must to be allowed to dry out until grass is established and has greened up.

C. After the two week establishment period gradually reduce the watering schedule to 1" per week until project acceptance unless rainfall precipitation is adequate.

3.5 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Landscape Architect:
   1. Satisfactory Sodded Turf: At end of construction period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.6 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

END OF SECTION 329200
SECTION 32 93 00 – PLANTING BED PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including Terms and Conditions (Construction) and Technical Specifications, apply to work of this section.

1.2 SUMMARY
A. Section Includes:
   1. Planting bed preparation for plants to be installed by others.
B. Related Sections:
   1. Division 32 Section "Turf and Grasses" for turf planting.

1.3 DEFINITIONS
A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
B. Finish Grade: Elevation of finished surface of planting soil.
C. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
D. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
F. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS
A. Product Data: Submit product information for each type of product indicated, including soils, compost, and mulches.
B. Samples for Verification: For each of the following:
   1. Compost and Hardwood Mulch: 1-pint volume of compost and mulches in sealed plastic bags. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

1.7 PROJECT CONDITIONS
A. Weather Limitations: Proceed with plant bed preparation when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

B. Coordination with Turf Areas (Lawns): Prepare planting beds after finish grades are established and before planting turf areas unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SOIL AMENDMENTS
A. Compost: Manure Compost as furnished by The Natural Gardner, Austin, TX, phone: (512) 288-6113; well-composted, stable, and weed-free organic matter made from cow manure, stable bedding, and vegetable waste, free of noxious weed and pathogens.

2.2 PLANTING SOILS
A. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments in the following quantities to produce planting soil:

2.3 MULCHES
A. Hardwood Mulch: Double shredded native Hardwood Mulch free of noxious weeds and pathogens.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine areas to receive plant beds with requirements and conditions affecting installation and performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
   3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
   4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION
A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by plant bed preparation work.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 4 inches. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner’s property.
   1. Spread planting soil to a depth of 8 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
      a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.
   1. Trees in Turf Areas: Apply shredded hardwood mulch ring of 3-inch average thickness as detailed. Do not place mulch within 2 inches of trunks or stems.
   2. Hardwood Mulch in Planting Areas: Apply 2-inch average thickness of mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 2 inches of trunks or stems.

3.5 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

3.6 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner’s property.

END OF SECTION